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PRIMER AND BOOK ONE

TEACHING Numbers We Need

BROWNELL - WEAVER

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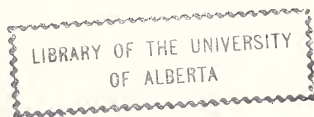
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Teaching Numbers We Need

PRIMER and BOOK ONE

WILLIAM A. BROWNELL and J. FRED WEAVER



The authors wish to acknowledge the assistance given by Jean Fleischman
in the preparation of the teaching pages in this *Teachers' Edition*.
Pictures of children by Ursula Bostick

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CONTENTS

	PAGE
THE NATURE OF THE PROGRAM FOR <i>NUMBERS WE NEED</i> (For complete contents see page 1)	
Purpose of the Program	1
The Learning Process	3
The Teaching Process	5
Materials of Instruction for the First Year	7
SUPPLEMENTARY HELPS FOR TEACHERS (For complete contents see page 11)	
Instructional Aids	11
Bibliography	26
READINESS LESSONS AND TEACHING THE PRIMER—THE PROGRAM FOR THE FIRST HALF YEAR	
Learning Objectives for the First Half Year	30
Systematic Instruction for the First Half Year	
Discussion of the First Period of Instruction	32
Readiness Lessons for the Primer	36
Discussion of the Second Period of Instruction	42
Text Pages and Lesson Plans, Primer Pages 1-26	46
Discussion of the Third Period of Instruction	73
Text Pages and Lesson Plans, Primer Pages 27-54	75
Discussion of the Fourth Period of Instruction	103
Text Pages and Lesson Plans, Primer Pages 55-80	105
TEACHING BOOK ONE—THE PROGRAM FOR THE SECOND HALF YEAR	
Learning Objectives for the Second Half Year	133
Systematic Instruction for the Second Half Year	
Discussion of the First Period of Instruction	136
Text Pages and Lesson Plans, Book One Pages 1-25	142
Discussion of the Second Period of Instruction	168
Text Pages and Lesson Plans, Book One Pages 26-52	171
Discussion of the Third Period of Instruction	199
Text Pages and Lesson Plans, Book One Pages 53-71	202
Discussion of the Fourth Period of Instruction	222
Text Pages and Lesson Plans, Book One Pages 72-96	225
Suggestions for Extended Work on Basic Facts	252
New Words by Pages in <i>NUMBERS WE NEED</i> Primer	252
New Words by Pages in <i>NUMBERS WE NEED</i> Book One	252

THE NATURE OF THE PROGRAM FOR NUMBERS WE NEED

	PAGE		PAGE
Purpose of the Program	1	Use of Number-Symbol Representations	7
The Social Aim	1	Verbally described situations	7
The Mathematical Aim	2	Numerals and the signs of operation	7
A Well-Rounded Program	2	Materials of Instruction for the First Year	7
The Learning Process	3	The Primer and Book One	7
The Nature of the Learning Process	3	The Teachers' Edition	8
Types of Learning	3	Organization of the Teachers' Edition	8
Arbitrary Associations	3	Using the Teachers' Edition	8
Meanings	3	Ginn Instructional Aids	8
The numbers	3	The Ginn Arithme-Stick	9
The number facts	4	Ginn Number Cards	9
Emotional Responses	5	Picture Number Cards	9
The Teaching Process	5	Pattern Number Cards	9
Common Principles	5	Pattern Cards for Number Facts	10
Organizing Teaching Experiences	6	Incidental Number Situations	10
Manipulative Experiences	6	Enumeration	10
Real objects	6	Ordinals	10
Representative objects	6	Reading and Writing Numerals	10
Experiences with Pictures	6	Occasions for Using a Variety of Arithmetic Ideas	10
Pictures of real objects	6	and Skills	
Pictures of representative objects	6		

Purpose of the Program



NUMBERS WE NEED, *Primer, Book One*, and *Book Two* with the accompanying *Teachers' Editions* provide a planned program in arithmetic for Grades 1 and 2. Note the words "a planned program in arithmetic." NUMBERS WE NEED is based upon the assumption that the best instruction in arithmetic is *organized*, that is, designed to accomplish certain identified results, period by period. Before we enter upon the details of the suggested program, it will be well to understand just what these statements mean and the reasons they are made.

One does not need to look very far to find all sorts of opinions about arithmetic as a body of subject matter for Grades 1 and 2.

1. There are those who contend that arithmetic is "too hard" for school beginners and who accordingly ban arithmetic instruction entirely in these grades.

2. At the opposite extreme are those who hold that children today are no different from children thirty years ago and that

the arithmetic program of the earlier time is just what the school should now be offering.

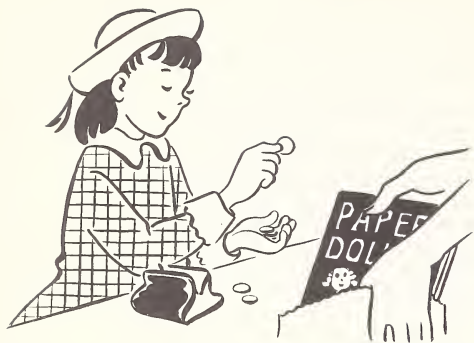
3. A third group varies somewhat from the second in that they want some number work in the primary grades but usually insist that the program be based on the children's day-by-day number needs that evolve incidentally in their school experiences. This group will sometimes use written materials but the materials they select represent rather unsystematic activities concerned with certain concepts.

4. Then, there is a fourth group which holds that arithmetic is a perfectly proper subject of study for primary-grade children if the arithmetic content to be taught is selected and organized carefully with respect to children's abilities, interests, and needs. This is the position and program advocated by the authors of NUMBERS WE NEED.

The Social Aim

In the last analysis the reason we teach arithmetic is a social reason. Our culture is a highly quantitative one, and its members can live effectively, intelligently, and happily only as they can deal confidently and wisely with the many quantitative situations of daily life. To state the matter negatively, we do *not* teach arithmetic in order to strengthen the muscles of the mind, as was supposed at one time; nor do we teach it out of respect for tradition or in the hope of making every child a mathematician. Arithmetic can justify its place in the curriculum only as it makes a real difference—a valuable difference—in living. It is, or should be, a practical subject, a useful subject.

The substance of the foregoing paragraph may be summarized by saying that arithmetic has a *social aim*. It contributes to better living. Moreover, this advantage is not to be thought of as one



which can be realized only in adulthood. We may not separate from their daily experiences the arithmetic we teach children in the pious hope that, however useless arithmetic may seem to be at the time, it will become useful later on. Functionless knowledge does not keep. Such knowledge is forgotten; and years later, when it may be needed, it will not be available. Instead, children, when and as they acquire arithmetic ideas and skills, must have real opportunities to put these ideas and skills to use in ways that are significant to them. By so doing, they become sensitive to the quantitative aspects of their experiences; they form habits of using their knowledge; and they see, while they learn, the values and worth of what they are learning. It is for these reasons that we list among the learning objectives for each half grade the attitudes and other emotional products along with the goals of instruction that are customarily recognized.

The Mathematical Aim

It is obvious, however, that children (and adults) can scarcely appreciate the usefulness of arithmetic (and so attain the social aim) if they are not really competent in arithmetic. They must have a high degree of command over the number facts. They must be able to compute quickly and accurately in work with whole numbers, fractions, and decimals. This knowledge and proficiency in skills we formerly tried to produce by methods which can be described as those of drill. Children learned mechanically, by memorizing; and arithmetic was classified in courses of study and even in professional treatises as a "tool" or "skill" subject, along with spelling and reading.

Mastery of number facts and of computational operations is regarded today as absolutely essential, just as it always has been. But we have come to see that drill administered by the teacher and unintelligent, repetitive practice on the part of children cannot yield real arithmetical competence. We have come to see, too, that arithmetic is not a mere tool or skill subject but a content subject, as truly as are geography and history. There is

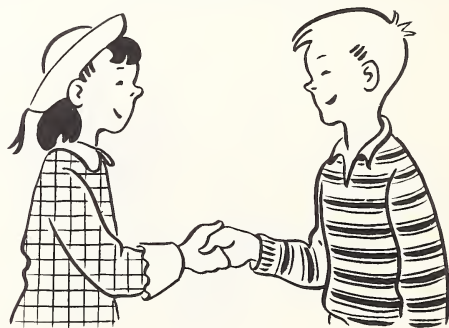


more to learning a number fact like $4 + 2 = 6$ than the memorization of the verbal formula, because $4 + 2 = 6$ is a generalization, and it must be understood if it is to function. There is more to adding than mechanical "figuring," for one must understand the process of addition itself, the numbers involved, the effect of the process on these numbers, and the occasions when one should and should not use addition.

You must have noted in the foregoing paragraph the emphasis placed upon understanding, a mental process that did not stand out at all prominently in the arithmetic program of some decades ago—or, for that matter, in modern programs of purely incidental instruction. The content of arithmetic mentioned above includes relationships, ideas, and generalizations (as stated). It is these that make arithmetic a system of quantitative thinking; it is these, along with the skills that are concomitantly developed, which enable the individual, child or adult, to be really competent in arithmetic.

Now, these relationships, ideas, generalizations, and the concomitant skills are all mathematical in nature, and from this fact instruction in arithmetic derives its second aim, namely, a *mathematical aim*. As the intent of the social aim is to make arithmetic clearly useful to children, just so the intent of the mathematical aim is to make it sensible and ready for use. Experiences with number need to be meaningful to children if they are to attain the mathematical aim, just as they must be significant to children if they are to attain the social aim.

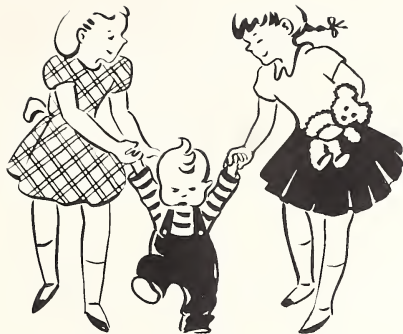
A Well-Rounded Program



We have no choice to make between the social aim and the mathematical aim: we cannot stress one to the exclusion of the other and still have a complete, well-rounded program. Neither is there any conflict between the two aims. Rather, they should be viewed as complementing each other. Gains in mathematical understanding and skill should make arithmetic more useful, while use of arithmetic should motivate further learning.

Yet, the two aims, mutually related as they should be, are not to be attained in precisely the same way. Different activities are needed. Number situations must be looked at mathematically if they are to yield understanding and skill but, to further the social aim, they must also be used when occasions arise for applying arithmetic already learned or for showing the need for new learning. Meaningful arithmetic situations contribute to the mathematical aim; significant situations, to the social aim. We must arrange experiences so that *both* aims may be realized—with an arithmetic period to develop understanding and skill, and with the activities of the whole day (both planned and incidental number experiences) to reveal its significance.

The Learning Process



The Nature of the Learning Process

We sometimes think that all learning can be pictured like line (a) in the diagram at the right. We start at point *x*, doing from the outset just what we will be doing at the end, but able, when we reach point *y*, to do it more rapidly and accurately.

Is this the way the infant learns to walk? Is his final performance at point *y* just what it was at point *x*, or is it remarkably different? Is not the course of his learning better depicted by line (b) in the diagram? He moves gradually upward from point *x* as he learns, kicking alternately with his legs, sitting upright, standing with support, standing without support, walking with help, and finally walking without help. The horizontal lines in the chart stand for the different stages or levels of his development; the length of a line indicates how long he remains at a stage. Each of the lower levels, actually an end in itself so far as the child is concerned, contributes to the next, and that to the next, and so on. Each advance is supported by what has preceded. The earlier types of performance are not lost or eradicated, but rather are retained (hence, the dotted extensions of the horizontal lines) and can be used if for any reason difficulty arises at a higher or later level.

As you read on, you will see over and over again the provisions that have been made in **NUMBERS WE NEED** to match at every step of the way the child's mental development in quantitative thinking. This special emphasis on meeting the child's real learning needs is an important and unique feature of **NUMBERS WE NEED**. It means that every child in your classroom will receive a real start on his way to the intelligent mastery of arithmetic so much needed in our modern world.

Types of Learning

In arithmetic, one attempts many types of learning. One learns symbols (+, -, =, the numerals 0 to 9); ideas (the meanings of numbers and of the basic operations); skills (ways of finding the results of combining groups, as in computation in addition and multiplication); complex techniques (the solving of actual life problems and of those verbally described); and attitudes (for example, respect for the logic of arithmetic and the disposition to use what is learned). The process employed to achieve these different types of learning naturally varies.

Arbitrary Associations

As is true of all other school subjects, learning arithmetic involves the mastering of what may be called *arbitrary associations*. Illustrations of these are: \times is the sign indicating that we are to compute in a certain way (multiplication); "sum" is the name we give to answers in addition; "7" stands for a group of seven; "inch" is one of the twelve equal parts of a foot. True, each of these words and symbols stands for an idea, and each idea must be meaningful; but the association of the word or other symbol with the idea is purely arbitrary. That is, there is no observable logic in the symbol itself or in its use in representing the corresponding idea. Hence, in the case of arbitrary associations the learning process is very simple: one memorizes the symbols or the words.

Meanings

The larger part of arithmetic, and the part that is harder to learn (and to teach), goes much beyond arbitrary associations and involves *meanings*—there are ideas (such as those concerning the numbers and the fundamental operations), generalizations (such as "Tens are added like ones."), relationships (such as "Changing the order of addends does not affect the sum."), and skills (like column addition). Yes, we include skills in this category, for in order to be remembered and used, skills must be meaningful rather than purely mechanical.

In acquiring meanings, one is ill-advised to rely upon memorization. He can memorize the nonsense word "goletis" (gō-lē'tis) very easily; but when he has mastered it, he cannot use it, because it possesses no meaning. For example, which, if any, of these sentences is correct? "Her goletis is purple." "The airplane goletis beautifully." "Goletis sell for a dollar a dozen



today." Repetitive practice (memorization) cannot possibly reveal the meaning of this word. Yet, too often in the classroom we assume that enough such practice is all that is needed to develop ideas or skills. Instead, what is required is a variety of experiences, differing one from another and arranged sequentially so that the meaning can be identified and extended. Let us consider two illustrations from arithmetic.

The numbers. Numbers possess different kinds of meaning: the serial idea, the group idea, the component idea, and the ratio idea. Most children come to school with some grasp of the *serial idea*. That is, they usually can say the counting names in order in a rote manner. This understanding is prerequisite to finding how many in a group, as "nine" (the cardinal idea) or to finding the position of a particular item in a series, as the "ninth" (the ordinal idea). This serial understanding of the numbers needs considerable development because it will not serve its full purpose unless the pupil reaches the point where he knows that 8



comes before 9 and that 9 is the number after 8, and so on. However, knowing the serial meaning to the point where he can enumerate does not carry the child far enough. He must know other meanings for a number before he will be competent in working with numbers combined as in $4 + 5$, and so on.

The number *nine* has an identity as a group. One can think "nine" without thinking of the nine ones to which it can be reduced. Thus, at a glance, one can identify as "nine" such a regular pattern as the one at the right and do so without counting, for now the number has its own unity. It is for this reason that we recommend practice with visual groups in the standard patterns shown on page 13 of this *Teachers' Edition*. Since these patterns are distinctly different from one another, pupils will learn to recognize each one instantly, thereby progressing from the serial idea to the *group idea* for each and every number.

But "nine" has still other meanings. For example, *nine* is *one and eight*, *two and seven*, *three and six*, *four and five*, and so on. That is, "nine" can be thought of in terms of its component parts (here, two parts, but *nine* is also *six and one* and *two*, and so on, as well as *three and three*). The child will not discover the component meaning of "nine" from counting or from the study of visual grouping of nine real or representative objects. Different kinds of experience are called for and, in *NUMBERS WE NEED*, much is made of the *component idea* of numbers as a basis for developing later the number combinations in addition and subtraction. Our program also uses the component idea when the meanings of the numbers larger than 10 are taught: that is, 23 is two tens and three ones; 48 is four tens and eight ones, and so on. This kind of understanding of the larger numbers plays directly into the development of intelligent skills in addition, subtraction, multiplication, and division, as you will see shortly.

Last of all, "nine" can be thought of in terms of the *ratio idea*; that is, as a number showing the relation between two quantities. If Ralph has \$27 and Joe has \$3, we can say that Ralph has 9 times as much money as Joe ($9 \times \$3 = \27) or that *nine* is the number which shows the relation between \$27 and \$3 ($\$27 \div \$3 = 9$). A helpful way of expressing this relationship is to say that Ralph has \$9 for every \$1 that Joe has. This ratio idea of a number is developed carefully through suggestions in the *Teachers' Editions* and presented in the *Book Two* text in connection with multiplication and division relationships.

The number facts. Number combinations, up to and including $9 + 9 = 18$, $18 - 9 = 9$, $9 \times 9 = 81$, and $81 \div 9 = 9$, are usually referred to as number facts. The very name, number facts, seems to imply the way they are to be learned. Why, there is nothing to it, is there, except to memorize them? Yes, indeed, there is more to it than this.

Witness the child who can quickly give the correct answer "6" for "How many are 4 and 2?" or " $4 + 2 = ?$ " but who is completely at a loss if asked, "Sue put two more dolls' dresses with the four she already had in a pile. Then how many dresses were in the pile?" Answers may be "seven," or "ten," or almost any other numeral. What is the child's difficulty? Well, in the verbal problem do you see " $4 + 2$?"—this simple expression and no more? Our hypothetical child does not; he lacks the usual "cue" ("How many are 4 and 2?" or " $4 + 2 = ?$ "), to which he has attached the pat (and meaningless) answer "6." In a word, he has established an arbitrary association when he should have been encouraged to develop a series of meanings and a special relationship among them.

The so-called number facts are really generalizations. They are abstract formulations which refer to all kinds of situations. Thus, $4 + 2 = 6$ holds true whether we are combining groups of bananas, of people, of haystacks, of dollar bills, of tens, of sixths, or of tenths. The only condition is that the groups combined must contain like-objects or be like-numbers. It takes time to grasp this generalization; or, better, it takes a wide variety of experiences distributed over a rather long period of time.

To know $4 + 2 = 6$ as this fact should be known if it is to be really functional, the child must

- know the meanings of numbers 2, 4, and 6 as groups;
- understand that 2 and 4 are components, or parts, of 6;
- understand the process of addition (or putting together) by which 2 and 4 can be associated to make 6;
- be able to recognize the combination when presented in some tangible manner (as with objects);
- be able to reproduce the combination when asked (again, with objects);



- be able to think the combination in verbally described situations;
- understand the relationship between $4 + 2 = 6$ and its related addition fact, $2 + 4 = 6$;
- understand its relationship, as well, with the subtraction facts $6 - 4 = 2$ and $6 - 2 = 4$;
- be able to supply the sum 6 quickly, accurately, and confidently to $4 + 2$ however presented.

Is it any wonder, then, that in the *NUMBERS WE NEED* program we refer, not to the mastery of the number facts, but to the *intelligent* mastery of the facts? Well, how is the process of learning to be described?

Look again at the picturing of the learning process on page 3 and think in terms of learning number facts. As we have said before, the process of learning these facts is not by memorization. The child who is at point *x* only seems to arrive at point *y* by repeating incessantly the words for a number fact such as $4 + 2 = 6$. Witness his helplessness when, having forgotten the sum, he has no way to find it other than by blind guessing. And the matter is made worse by the fact that he must learn not merely $4 + 2 = 6$ but many other such generalizations. With

no meanings to hold them together, he becomes hopelessly confused, just as you would if you were asked to memorize hundreds of unrelated nonsense statements.

Line (b) in the diagram then shows how children learn the number facts when meaning and understanding are stressed. We are quite willing that the child count, even count separate objects, in his first encounters with a number fact, for he is near point x and counting makes sense to him. But we do not leave him there. By helping him find a higher level of performance, perhaps starting with a group and counting the extra objects, we assist him to move to the next level. Then we help him to get along without objects or we have him deal with groups of objects without identifying the individual items. Still later we encourage him to see that he can find sums mentally by solving number combinations. Thus, $4 + 2$ can be transformed mentally into $3 + 3$ or into $2 + 4$ or into $4 + 3 - 1$, and so on. Such ways of thinking of the combination bring him closer and closer to point y , where, with the background of understanding he has accumulated, he moves finally into the simple verbal formula for the number fact $4 + 2 = 6$.

In NUMBERS WE NEED we give a good deal of attention to the intermediate stages of thinking of the number combinations, between counting separate objects on the one hand and the eventual mastery of the verbal formula on the other. We actively teach these ways of thinking, for our goal is intelligent mastery of the facts. We recognize that children may, when left to their own devices, stop short of ultimate mastery of the fact as such; but our method is not to demand the elimination of lower stages of thinking. Rather, it is to help the child find a better way. Once he is convinced of its superiority (it is quicker; it is less open to error), he will adopt the new procedure and move on.

Emotional Responses

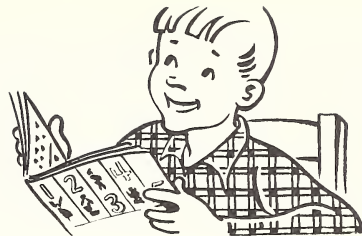
It is a mistake to think that learning is a purely intellectual thing, untouched by emotion. On the contrary, much of what we learn is emotionally colored, and *emotional responses* are commonly learning outcomes, whether or not we intend them to be. Such ideas as "mother" and "my country," to choose but two, are constellations of attitudes, values, and sentiments as truly as they are intellectual entities.

The Teaching Process

Common Principles

While there is no one best way of teaching, analysis of good teaching reveals certain common principles. Many of these principles have already been illustrated in the discussion preceding this section. The others listed below are familiar to you and so require no elaboration. We suggest that you read them slowly and carefully and that, once you are convinced of their worth, you employ them in teaching your pupils.

1. We should make arithmetic sensible to children as they learn it.
2. We should insure orderly progress in the development of children's quantitative thinking.
3. We should develop meanings before we present written symbols and assure understanding before we assign drill.
4. We should organize our materials for developmental learning but each learning segment must be extensive enough to assure understanding and skill for the material presented.
5. We should see to it that children's activities harmonize with the purposes of arithmetic.
6. We should present arithmetic as an object of natural interest to children.



Children acquire attitudes toward arithmetic: they like it or dislike it or are indifferent to it. They may enjoy *adding* but not *dividing*. They may attack verbal problems as interesting challenges or seek to avoid them in every way possible.

Nor does emotional learning stop with arithmetic as a whole or with any of its various aspects. As they study arithmetic, children acquire personality and character traits. In arithmetic, as in other school subjects, they can develop commendable pride in doing good work; they can come to prize neatness in their papers; they can become self-reliant and honest, refusing to go to others for what they cannot do themselves.

A liking for arithmetic comes from success in achieving the goals set for learning; an indifference or a hostility comes from failure. The goals referred to, while they may be initially suggested by the teacher, must be adopted by the child as his own. Otherwise, success or failure is pointless to him. It follows that failure is to be prevented by seeing to it that the child is psychologically (emotionally and intellectually) ready for the new idea or skill. If failure occurs, then steps need to be taken to discover and remove the sources of difficulty.

If through arithmetic (as through other subjects) we would seek to engender in children worthy values and personal virtues, the course of action is rather obvious. We must hold these learning objectives before children, help them to identify them in their own behavior and that of others, show the opportunity to exercise them in all sorts of situations, and assure that, whenever they are exhibited, the total experience is a rewarding one for them.

7. We should realize that the way children think of numbers and number operations is as important as is the result of that thinking.
8. We should be sure that children will know both what they are to learn and how well they are learning it.
9. We should teach at the rate at which children learn.



Organizing Teaching Experiences

We have emphasized several times the progression in thought processes characteristic of movement toward mature, economical, well-habituated but intelligent ways of dealing with quantitative situations. We have also suggested, most recently in Principle 4 above, that the materials of instruction should be organized so as to encourage this progression in thought process. The sequence of the use of materials involves, successively, manipulative experiences with real objects and with representative objects; identifying the idea in pictures of real objects and of representative objects; and identifying the idea in abstract form (words, signs, numerals, and the like). Let us consider these types of material in order.

Manipulative Experiences

The materials used in instruction must always be adjusted to the child's level of thinking. When he can "think" only by using objects, then we work with objects. When he can "think" with abstract numerals, then abstract numerals become the materials of instruction.

The beginning stages in meaningful thinking are especially critical. Initial experiences must not be too abstract or too unrelated to real situations. If they are, then the child cannot grasp the content of a new idea or the rationale of a new operation. Instead, he must be able to discover in the materials of instruction the new meanings he can check and test to make them sensible. So, we start with real objects.

a. Preferably, we begin with the *real objects* of the classroom—chairs, books, pencils, sheets of paper, erasers, the children themselves. Thus, the child can discover that 4 and 3 together make 7 by manipulating groups of like-objects: four children are at the front of the room; three more are made to join them (the movement of the joining demonstrates the idea of addition); and the total (seven) can be determined directly, at first by counting and later by inspection. Real objects have the distinct advantage of being parts of an equally real social situation that contains the new idea or skill.



b. But work with such real objects has certain disadvantages, too, if it is held at that stage too long. For one, thing, real objects are likely to be cumbersome and relatively unmanageable. For another, real objects may distract attention from the arithmetic idea or skill being taught since they may be overly interesting in themselves. For still another, their use may be limited to activities on the part of the teacher or a single child who moves the groups about. So there should be a transition to what we call *representative objects*—objects to stand for real ones.

Each child should have his own sets of small and easily managed representative objects, such as milk-bottle tops, lollipop

sticks, pegs, checkers (or similar counters), acorn tops, buttons, lima beans, wooden skewers from which the points have been removed, and so on. Note that he should have several sets—at least three—each set numbering about 20 of each type chosen. These sets can be kept in divided boxes, one box for each child.

These objects of a representative nature can be used in place of real objects, which they represent, in much the way illustrated with the groups of children. Each and every child, and not just one or two children, makes up his own groups and manipulates them as required by the learning situation. Moreover, since these objects are simple and not distracting, attention can be concentrated on the new idea or skill. In other words, with these the child takes a step toward the abstract.

Experiences with Pictures

Children take their next step toward abstract ways of dealing with numbers and number situations when they substitute for actual manipulation some experiences with pictures of real objects and of representative objects. As with manipulative experiences, we distinguish between pictures of two kinds of materials—real objects and representative objects.



a. The first of the pictorial representations, *pictures of real objects*, is illustrated in the pupil's text on pages which show social situations of a real sort. At first glance, one may not note the numerical aspects of the situation, even though the picture has been designed to contain groups of various sizes; for instance, groups of three, of four, and of five. Under guidance, the children are to isolate and identify these groups, disregarding for the time being other features of the picture.

In so doing, children react just as adults do typically when they face a quantitative situation. Very rarely indeed do adults encounter the need in and of itself to multiply 56 by 37, as in the example 37×56 . Rather, this need comes to them imbedded in a situation; and most of the irrelevant details must be stripped away to allow for attention to the essential arithmetic elements. Pages picturing social situations of a real sort present number tasks for children, but at their level of ability, and numbers are seen to be normal parts of the social situations.

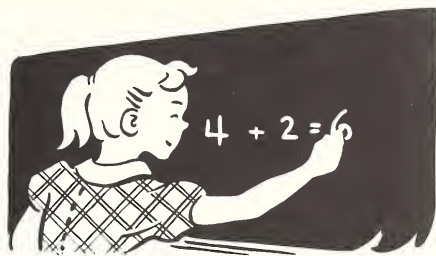
b. But pictures of real objects, as just described, may distract from the business at hand, for the situations shown may be tied up pretty closely to particular events or to normal happenings in the lives of children. Hence, we employ a second kind of pictorial material that can be thought of as *pictures of representative objects* which stand for real ones. Instances of such are pictures of triangles, squares, dots, circles, moons, and stars—all practically devoid of elements of intrinsic interest.

Use of Number-Symbol Representations (Words and Numerals)

The ultimate aim of instruction, of course, is to equip children to deal with numbers and number relationships without external representation of any kind. That is to say, we want them to be able to think of numbers and to deal with number relationships in abstract ways. This they must be able to do if they are to manage their affairs, both as children and as adults, economically and intelligently. We need, therefore, to relate the experiences with objects and pictures to the use of words and numerals as representations of ideas. Here again we can recognize two types of instructional materials—verbally described situations, commonly called “word problems” or “verbal problems,” and abstractly presented situations, or examples.

a. By a *verbally described situation* we mean a problem such as this, stated in words: “If we take away two of the five chairs at the table, how many will be left?”—something which may arise out of an actual classroom or home event or out of a hypothetical event specially chosen for practice purposes. Here the children must be able to substitute, at least in part, ideas for objective groups and perform the operation abstractly, through imagination.

There is no point in the *Primer* where the program in problem-solving may be said really to begin, for such experiences can and should be used continually. Liberal use is made of verbal problems, presented orally, of course, by the teacher. As you will discover, this *Teachers' Edition* contains many problems suggested for use at strategic points in the program. Solution at first is always oral, in order to permit a check on the children's procedures. In *Book One* there is an easy transition to the traditional



kind of problem-solving, with the problems still presented orally but solved in writing, and then later presented through reading and solved in writing.

b. As a culmination, the children are expected now to deal with *numerals* and the *signs of operation*. In more familiar language, we may say that they now respond economically and intelligently

to such expressions as $4 + 3 = ?$ and $\frac{8}{-6}$ and $3 - 2 = ?$. In the examples just cited, we use numerals and the signs $+$, $=$, $-$. Note that in the *NUMBERS WE NEED* program each such number task comes at the end of a carefully planned sequence of learning. It is not given to children early in learning and then drilled on by unremitting and unrewarding practice. After many experiences of many types, pupils learn (master) number tasks as such. And let there be no doubt on this point: nothing less than mastery is acceptable eventually, but it is not to be expected (or sought) prematurely.

Materials of Instruction for the First Year

The Primer and Book One

Do not confuse these pupils' texts with the kinds of workbook often put into the hands of primary children or with other sorts of learning and teaching materials (that is, books of pictures) which have appeared in recent years.

One kind of workbook is a practice, or drill, book. It is designed to be largely, if not wholly, self-administering. It is replete with exercises (too often predominantly with abstract numerals) for which children write answers. It may or may not have been prepared with a view to providing a psychologically sound sequence of learning experiences. Hence, it can hardly be described as a helpful guide in developing ideas and understandings.

Some other primary instructional materials take the form of picture books. Teaching is oral; the children, as a group with the teacher, talk about the pictures, but have little or no opportunity to work individually and to record in writing the results of that work. Again, there may or may not have been careful attention to the ordering of learning experiences.

The *NUMBERS WE NEED Primer* and *Book One* are neither self-administering practice books nor number picture books for oral use only. Each is a teaching and a learning instrument, which at the same time provides practice on ideas or skills which have been carefully developed. Lessons regularly begin, so far as the *Primer* or *Book One* itself is concerned, with the oral discussion of appropriate pictorial materials. (Usually, as will shortly be explained, work with the pages of the *Primer* and *Book One* follows “pre-book” experiences which prepare children for the *Primer* or *Book One* exercises.) Under guidance, the children

identify the new thing to be learned and discover ways of dealing with it and of recording their answers. (Answers are not always numerals, but may be, for example, the altering of pictures grouped in indicated ways.) Only when children know what they are about are they encouraged to work ahead on their own. Even then, when they are engaged in practice, children are under the guidance of the teacher, for the teacher moves about the room giving aid to individuals as needed.

It is for these reasons we say that the *NUMBERS WE NEED Primer* and *Book One* are teaching and learning instruments. The teacher has optimum opportunity to guide her pupils, all according to a plan. And the children are always learning and this, too, according to a plan. Their experiences are ordered



and arranged sequentially in accordance with the pedagogical dictum: start with the children where they are, but take them somewhere. In the *Primer* and *Book One* we have undertaken to select and to arrange learning activities which will enable you in your teaching to respect both parts of this prescription. As an example, note the provisions (page 132, *Teachers' Edition*) that have been made in *Book One* for stopping the work with 6's or going on through 7's if desirable.

The Teachers' Edition



You may never before have seen an arithmetic teachers' edition like this one. Leaf quickly through it and see if this statement is not true. Note the large amount of help and the variety in the forms of help you are given. But note also: this *Teachers' Edition* is no mere book of recipes for teaching arithmetic. It offers practical suggestions, yes, but it goes beyond these suggestions to explain the reasons for them.

Organization of the Teachers' Edition

Suppose we begin by noting how this *Teachers' Edition* is set up to follow the discussion on the nature of the program for NUMBERS WE NEED.

Sections of pages preceding the suggestions for teaching the text pages of each pupil's book are intended to give you an overview of the program for the half year and for each period of instruction. These pages suggest how to get started as well as what to teach. The learning objectives to be achieved are listed, but the listing is no mere catalogue of items arranged in some logical or chronological sequence. This *Teachers' Edition* does much more than this. It attempts to elaborate upon the modern conception of arithmetic, the conception according to which the NUMBERS WE NEED program has been written and according to which it may be taught. Even on the first reading, however, you will see many chances to enrich the program from your own experiences.

A good deal of attention is paid in this *Teachers' Edition* to the nature of the learning process in arithmetic. Through numerous illustrations of what is involved as children learn specific ideas, skills, and attitudes, the *Teachers' Edition* helps you see how to utilize the best psychological procedures in guiding the learning.

Also in this *Teachers' Edition* you will find: first, a section devoted to instructional aids which includes suggestions for games, devices, and equipment useful in the teaching of first-year arithmetic, as well as a list of suitable commercial films and filmstrips; and second, a bibliography of books, pamphlets, and periodicals containing material appropriate to the program in arithmetic.

There are also sections, one for each period of the pupil's book, which provide the specifics of instruction. Each of these sections has a brief introduction summarizing the oral and written learning objectives of the period and, where necessary, explaining in some detail what they mean. The introduction each time is followed by page-by-page suggestions to help you

teach the separate lessons in the pupil's book as you come to them. Here you will find specific suggestions for activities to be engaged in before, during, and after each lesson. Included are ideas for maintaining objectives of the period, for enriching and individualizing instruction which may be adapted to your arithmetic program, or which will suggest to you ideas of your own. In this connection, also, you will find Looking-Ahead suggestions which through oral activities will lay the groundwork for written experiences later in the program.

In addition to the helps already mentioned, the *Teachers' Edition* gives you other helps. A very important one is that provision has been made so that you may have at hand every page in the pupil's book in full color. Consequently, in the *Teachers' Edition* you have before you a copy of each pupil's page and suggestions for teaching that lesson, as well as suggestions for maintenance work or for looking ahead to make preparation for work that is to come. You may use only the *Teachers' Edition* and thus eliminate the bothersome necessity of referring to both a manual and a pupil's book.

Using the Teachers' Edition

Our sole motive in preparing this *Teachers' Edition* has been to give you all the help we can. As authors, we cannot talk to you in the confines of the pupil's book, but in the *Teachers' Edition* we have the chance to tell you about the arithmetic program you will teach and to suggest ways of teaching it.

Please regard the detailed lesson plans merely as models. They show you how particular ideas or skills *may* be taught, not how they *must* be taught. Conceivably, some of our lesson plans may be just what you want, and in these cases you will adopt them. Just as likely, special conditions in your situation or in your experience may make our plans inappropriate. In such cases you will want to modify our plans or to reject them entirely, substituting your own. Any system of teaching that enables children to learn arithmetic economically, intelligently, and happily is a good one.

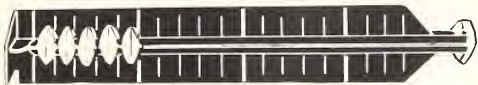
All teaching, whether of arithmetic or of anything else, should be stimulating, imaginative, creative, and artistic. It can be so only when teachers understand clearly what they are about. In this *Teachers' Edition* we have tried to help you gain this perspective; hence, the sections where we explain rather fully what is involved in an arithmetic idea or skill and in learning it for functional mastery.

Ginn Instructional Aids

There has never been any doubt about the importance of manipulative devices in the teaching of arithmetic. Their use has been and continues to be a basic part of the arithmetic curriculum and yet teachers know too well the difficulties often encountered. The making of devices can be extremely time-consuming, the cost of materials for the devices usually recommended can be considerable, and there are always storage and handling problems caused by the large number of different kinds of bulky items that must be cared for. As part of its complete program, from manipulative experiences all the way through textbook lessons and on to enrichment activities, Ginn and Company now offers a carefully planned, carefully researched set of instructional aids which emphasize a maximum number of manipulative experiences using a minimum number of well-designed, adaptable devices. Each Ginn teaching aid features durability and precision, appealing and functional over-all design, and ease of handling and storing. At the present time, the teaching aids available for the Primary program include the *Ginn Arithme-Stick* and *Ginn Number Cards*.

The Ginn Arithme-Stick

This manipulative, multipurpose device uses the building-block principle found in great computers. The *Ginn Arithme-Sticks* are packaged five sticks to a box, each stick having twenty snap-on beads. An instruction manual is included. It is intended that each pupil be provided with one of the sticks pictured below, but teachers may start with one package of five sticks and add a package yearly, thereby building toward a complete instructional-aid program.

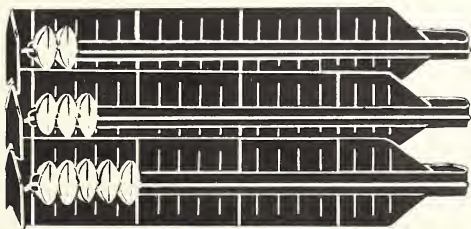


As can be seen from the picture, the *Ginn Arithme-Stick* is a track bent back upon itself in such a way that the twenty snap-on plastic beads with which it is equipped may be used in various manipulative experiences—sometimes with all beads evident on the front track, and at other times with some beads slid around to the other track for storage in a hidden position.

Every pupil supplied with an *Arithme-Stick* may participate in manipulative activities that will help him discover and learn addition and subtraction facts with sums and minuends to 18. He can have experiences with multiplication and division facts having products or dividends up to 20. Experience may also be gained in grouping on 10, in working with teen numbers, in counting by 1's or 2's or 3's, and so on, and in identifying ordinals—all are possible with just one stick.

Hundreds of experiences are thus opened to pupils on an individual basis, yet hundreds of other activities may be performed using the sticks joined together to make various devices. In fact, the unique and extremely adaptable *Ginn Arithme-Stick* will provide activities for pre-book or post-book lessons in connection with almost every page in the primary program for **NUMBERS WE NEED**.

The building-block principle increases the scope of the device and makes it useful all the way up through Grade 8. Manipulations heretofore possible only with a great variety of devices may now be centered around a set of *Ginn Arithme-Sticks*. When each pupil of a class of 30 is supplied with a *Ginn Arithme-Stick*, a group may work together combining their sticks. For example, there can be 15 models of an abacus for showing tens and ones; or 10 abaci for hundreds, tens, and ones; or 3 hundred-boards with 10 beads in 10 rows; or 15 sets of two rows of 10 beads, and so on.



All of the usual primary-grade manipulations are possible with devices made from combinations of sticks. Furthermore, those manipulations more appropriate for later grades (such as addition without and with carrying, subtraction without and with borrowing, multiplication without and with carrying, division without and with a remainder, fractional parts of a group,

decimal and percentage work, and so on) can be made clearer with the aid of the *Arithme-Sticks*.

The symbol above appears throughout the *Teachers' Edition* near the title of all lessons which lend themselves to the use of the *Ginn Arithme-Stick*. When you see the symbol associated with a particular teaching lesson, look for opportunities to use the *Ginn Arithme-Stick* before, during, or after the lesson in the text.

Ginn Number Cards

These cards have been developed expressly for the meaningful teaching of numbers, standard patterns, numerals, and number facts through 10. They are designed according to sound mathematical and educational principles that promote effective and efficient teaching and learning. Moreover, the cards are color-controlled for excellent visibility, with pictures and patterns that are clearly defined yet easy on the eyes. They are printed on tough, durable Bristol board that should last for years. The complete set, packaged in a convenient, compact portfolio, consists of 40 cards divided into three different kinds of cards as described below.

The five *Picture Number Cards*, or pumpkin cards, are used in helping pupils recognize and associate the correct numeral with random groups (pumpkins) in groups through 5 on one side and groups of 6 through 10 on the other side. Directly beside each group and separated from it by a dashed line is the numeral that names the group shown. These numerals are like those that pupils learn to write in the **NUMBERS WE NEED** arithmetic program. They are positioned in such a way that each card can be folded on the dashed line to hide the numeral when pupils are learning to recognize any one of the groups through 10 and yet each can be folded forward to help pupils associate the correct numeral with its group. You will note that pumpkins are used in each group, that they are of uniform size, and that they are grouped in random arrangement, rather than in standard patterns.

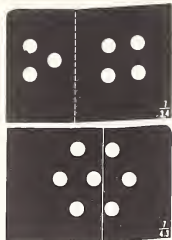


The ten *Pattern Number Cards*, or standard-pattern cards, are used in helping pupils recognize and associate the correct numerals with pictures of groups of representative objects (dots) arranged in the standard patterns through 10 taught in **NUMBERS WE NEED**. The importance of the group idea of the numbers 2 through 10 (for example, "3" is more than just a loose collection of ones; it has a unity in itself) and the values of representative objects for instructional purposes have already been mentioned. The *Pattern Number Cards* are designed to help you in this respect. As the standard patterns for groups of 2 through 10 are developed in teaching, the corresponding cards should be put on display, first in serial order, then in mixed order for practice in recognition. Flash-card drill should be arranged every now and then. It is essential that children advance beyond the serial idea of a number (in which they count the ones to which a number may be reduced) to the group idea of a number (in which they recognize the unity of a number by thinking it immediately without counting). The cards may also be displayed numeral-side-out for reference when pupils are in doubt about the written formation of any of the figures. Much use is made of these patterns in the pupil's text.



The twenty-five *Pattern Cards for Number Facts*, or folding whole-story cards, are used in helping pupils learn all of the facts with sums and minuends through 10.

The side showing the dashed line is used for discovery and practice of the addition facts. Here appear, in standard patterns, pictures showing two groups of representative objects (dots) that pupils are to *think* together in discovering the size of the combined whole. By folding each card along the dashed line, either one of the parts may be displayed first and, therefore, the dashed-line side of each card may be used for teaching two facts. For example, the card with 3 dots and 4 dots may be used to teach the facts $3 + 4 = 7$ and $4 + 3 = 7$.



On the opposite sides of the folding whole-story cards (the side without the dashed line) are the groups for teaching the subtraction facts. Here the pupil is helped immediately to recognize the whole because of the standard-pattern arrangement. No dashed line shows, but when the card is folded back along the same dashed line used for the addition side, the pupil can concentrate first on one of the parts of the whole and then on the other. Therefore, the card labeled $4-7$ in the lower right-hand corner may be used for teaching the two subtraction facts $7 - 4 = 3$ and $7 - 3 = 4$. These two subtraction facts, along with the two addition facts taught from the reverse side, make up the whole story about 7 and its parts 4 and 3.

Incidental Number Situations



What about occasions when the need for number occurs more or less incidentally, as in the routine of classroom activity? Is there any place at all for such number situations in this program of instruction? Emphatically, yes!

Think back to our earlier discussion of the social aim of arithmetic, the aim in accordance with which arithmetic must be seen by children as something worth learning, the aim which stresses the significance of the subject. Now, when children are busy acquiring arithmetic ideas and skills they are not apt, at the same time, to appreciate the value of what they are learning. Indeed, were they to do so, their attention would be divided, and instruction would almost certainly miss its mark. On the other hand, when they *use* arithmetic ideas and skills they have already learned to attain ends outside arithmetic itself, then they have firsthand evidence of the worth of their learning. Such may be the case in many incidental number situations which afford the best possible kind of occasion for practice. Be it noted, however, that children may use their arithmetic equipment so automatically that they do not recognize its part in the success of their efforts. On this account, it is necessary for you, from time to time, to ask such questions as, "Do you see how useful

your arithmetic is? Could you have done this (whatever it is) if you had not learned how to . . . (again, whatever it is)?"

What has been said about number situations which arise naturally during the school day, outside the arithmetic lesson, should not be viewed as applicable only to such situations. The contributions such situations make to the social aim of arithmetic can be enhanced more or less artificially. Arrange, by design, for number situations to arise when you are about to take a step forward in instruction (motivation). Contrive situations which call for the use of ideas already taught (practice). Arithmetic must not be confined to the arithmetic period. It must escape such restrictions and be thought of as permeating activities throughout the whole of the school day if the social aim is to be achieved.

Will occasions for the use or motivation of arithmetic learning arise during the day? And can you add to such incidental number situations? You can if you are yourself alert to your opportunities. Consider the few illustrative possibilities listed below.

Enumeration

- Determining the number of children present or absent
- Noting the number of books on the library table
- Counting out the number of scissors needed for a group of children
- Getting just the number of children needed for some activity or game
- Counting votes in an election
- Getting the correct number of feathers needed for an Indian headdress

Ordinals

- Finding the fifth book on a shelf of books
- Asking the third child in a row to be leader of the group
- Designating the place (as, second) of a child in a race
- Giving directions ("It is on the third shelf.")
- Referring to the place (sixth or first, for example) of a word in a column of spelling words

Reading and Writing Numerals

- Entering dates on a calendar
- Making a table of contents for a booklet
- Finding a page in a book
- Recording number of votes on the chalkboard
- Making price tags for a sale
- Recording daily temperatures for a week
- Placing numerals on a clockface
- Showing on the chalkboard the number of an auto-license plate
- Writing the prices of supplies to be bought for a school snack

Occasions for Using a Variety of Arithmetic Ideas and Skills

- Making a child's daily schedule
- Using a foot rule in measuring objects to be used in projects
- Telling about earning, saving, or spending money
- Watching the clock for radio programs
- Making a stamp collection, indicating the money value of canceled stamps
- Measuring the required distance for throwing beanbags or balls
- Weighing oneself on scales
- Determining the total number of books in piles (of, say, two or three books), without counting
- Adding the number of children needed (say, two) to a smaller group of children (say, three) to have a required number (five)

No, there need be no shortage of situations in which arithmetic ideas and skills may occur, or may be made to occur. The moral is self-evident: Make the most of them!

SUPPLEMENTARY HELPS FOR TEACHERS

	PAGE		PAGE
Instructional Aids	11	Fish with Bait	18
Charts, Cards, and Other Aids	11	Follow Me	18
Clothespin Counters	11	Guess Again (1-4)	18
Counting Chart	11	Hooked (1-5)	18
Flannel Board and Cutouts	12	I Want to Meet	19
Flexible Hundred-Board	12	It (1-3)	19
Number Box	12	Knock, Knock	19
Number Cards	12	Moving Man	19
Picture Number Cards	12	Number Bingo (1-3)	20
Pattern Number Cards	13	Numberland (1-5)	20
Picture Cards for Number Facts	13	Old Hat (1-8)	21
Pattern Cards for Number Facts	13	Out of Order (1-5)	22
Number Dictionary Chart	13	Over Orange (1-6)	22
Number Line	14	Patterns	23
Number Pockets	14	Postman (1-2)	23
Number Strips	14	Spin It (1-3)	23
Peg Board	14	Who Am I?	23
Perpetual Calendar	15	The Wizard (1-10)	23
Games	15	Zooks	25
Ask and Draw	15	Films and Filmstrips	25
Climb the Ladder (1-6)	16	Films	25
Connecto	16	Filmstrips	25
Cross the River (1-7)	16	Bibliography	26
Dominoes (1-2)	17	Professional Books and Pamphlets	26
Fish (1-6)	17	Periodicals	26

Instructional Aids

Charts, Cards, and Other Aids

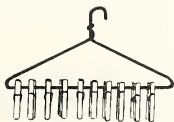
You will find in this section brief instructions for making some of the basic teaching aids used in the primary-grade arithmetic program. While for the most part the counterparts of these aids may be purchased from commercial sources, you should consider making your own since the plans are simple and call for common and inexpensive materials. Think of this section as providing suggestions only, for if you give your imagination free play, you will certainly discover better methods of your own for constructing the aids. In the teaching sections of this *Teachers' Edition* reference is made to the use of the aids as the opportunities arise.

Clothespin Counters

Obtain plastic spring-type clothespins in various colors and one or more wire coat hangers.

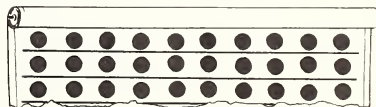
Ten clothespins of the same color may be hung from the hanger and used for a variety of counting experiences. Cards with numerals from 1 through 10 may be fastened to the clothespins if desired.

By using clothespins of different colors, experiences may be provided which relate to discovering or verifying component parts of groups, addition and subtraction facts, etc. The difference in color is not always essential but generally makes the work more effective or more appealing.



Counting Chart

A large chart containing ten rows of large blackened circles, ten in a row, is useful in connection with instruction and practice in enumeration. The chart can be drawn on a window shade. It then offers advantages in the matter of flexibility of exposure.



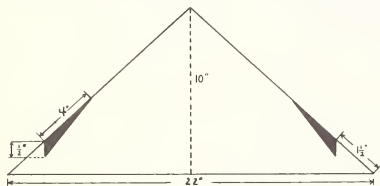
The fact that the circles are in rows of ten also has the value of suggesting early the decimal character of our number system. The chart may be hung on the wall or used in teaching groups of children or for individual practice supervised by the teacher or a more capable pupil. Use of the chart involves much more than the mere recitation of the numeral names in their serial order (rote counting). The purpose should always be to determine a total. Thus, the teacher or pupil monitor can cover all except the first three rows and the first two dots in the fourth row (to make 32), and ask "How many circles (or dots) do you see?" (This type of activity employs enumeration for the purpose of identification.) Or, the request may be, "Show me just 43 dots, and cover the rest." (Here we have enumeration for the purpose of reproduction, which is quite a different thing from identification.)

Flannel Board and Cutouts

An easily made variation of the familiar flannel board is described below.

With wrong sides together, sew two rectangular pieces of flannel (each approximately $21'' \times 30''$) on three sides and turn right-side out. Slide in a rectangular piece of cardboard, slightly smaller in size, and close the open end of the flannel pocket with snap fasteners.

A support for the board may be made by cutting from large, heavy cardboard a piece similar to the one shown below. Cut out the blackened area and fold on the dashed line.



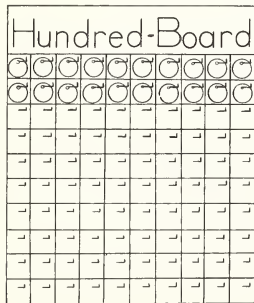
Cut simple objects and geometric forms of various sizes and shapes from different colors of flannel, or from different colors of construction paper. If cut from construction paper, glue small pieces of flannel or sandpaper on the backs of the cutouts so they will adhere to the flannel board.

Pictured and representative objects may be put on the flannel board in various groupings and patterns, and may be manipulated to illustrate combining and separating actions.

Flexible Hundred-Board

Obtain a piece of $\frac{1}{4}''$ plywood that is about $30''$ square. Or, if you desire to print the title "Hundred-Board" at the top of the board, use a board that is about $6''$ taller than it is wide. Then prepare the board in either of the ways suggested in the next two paragraphs.

Screw 100 small L-hooks on the plywood board in 10 rows of 10 hooks each. Allow about $2\frac{1}{2}''$ between L-hooks in each row



and the same distance between rows of hooks. Place the bottom row of hooks up far enough so that round, metal-rimmed key tags ($1\frac{3}{4}''$ to $2''$ in diameter) can be suspended from the hooks without extending below the bottom of the board.

Or, mark off the board in 100 squares—10 rows of 10 squares each—making each square about $2\frac{1}{2}''$ on a side. Center and screw a small L-hook near the top of each square so that the round, metal-rimmed key tags will be within the squares when hung from the L-hooks.

Then obtain 200 round, metal-rimmed key tags ($1\frac{3}{4}''$ to $2''$ in diameter)—100 of one color and 100 of another color. On each

set of 100 key tags write the numerals from 1 through 100. The sets of key tags may be used on the board in many ways. Here are a few suggestions:

1. Hang one set of key tags on the L-hooks to make the familiar hundred-board. In dealing with the serial order of numbers, one or more key tags may be removed or turned with the blank side out to indicate the missing numeral in a series. Instead of placing all 100 key tags on the L-hooks at one time, you may wish to build the hundred-board progressively, decade by decade, as you follow the systematic instructional program.

2. Prepare the board in the following manner for use with multiple counting experiences (counting by 10's or 5's or 2's).

For counting by 10's, use key tags of a contrasting color for the numerals 10, 20, 30, 40, . . . , 100.

For counting by 5's use key tags of a contrasting color for the numerals 5, 10, 15, 20, 25, . . . , 100.

For counting by 2's, use key tags of one color for the odd numerals and key tags of another color for the even numerals.

3. The *Flexible Hundred-Board* may be employed also in work with the tens-and-ones structure of numbers. To show a number such as 37, hang 37 key tags in 3 rows of 10 and 7 in the fourth row. You may use the key tags that are numbered 1 through 37, or you may use any 37 key tags with the blank sides facing up.

Number Box

Have each child bring to school a box about the size of a common $\frac{1}{4}$ -pound candy box. The lid of the box may be covered with colored construction paper and labeled "My Number Box" along with the child's name. This box should contain a collection of at least 10 each of several appropriate small objects that can be used as counters and that can be arranged and manipulated easily in various ways. Consider using checkers, buttons, small cubes, or the like. Avoid having children put spherical objects in the box (such as beads or marbles) or natural objects (such as peanuts) that will deteriorate or break easily. When appropriate, children may put "play" coins (cents, nickels, dimes, and quarters) in the box as well as dowels, tongue depressors, and so on. If necessary, have the children prepare separate number boxes for these latter materials.

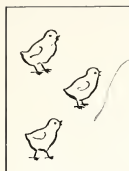
Number Cards

If the *Ginn Number Cards* described on pages 9 and 10 of the *Teachers' Edition* are not used, a set may be made by the teacher, or by pupils under her guidance.

Make the cards about $8\frac{1}{2}'' \times 11''$ using sturdy stock such as oak tag. When illustrations are required, use original art work, or cut out, arrange in attractive groups, and paste in place appealing pictures found in magazine advertisements (highly colored pictures of animals or small objects like cans of soup, cakes of soap, and the like). Cutout stickers of Santa Claus, pumpkins, flags, and the like may also be purchased in quantity from stationery stores. These are useful when the same picture is to be repeated over and over again, as in making *Picture Number Cards*. When numerals are to appear, try to duplicate the style found in the pupil's text.

Picture Number Cards. These are cards picturing groups of real objects for each number from 1 through 10, like that for 3 shown on page 13. The cards are for display purposes, and may be put up for exhibition, one by one, as children learn to read the numerals.

In making the cards, be sure that only one kind and size of pictured object is used in the series from 1 through 10, lest the children attach faulty notions to the objects themselves. If elephants are used for "two" and dogs for "eight," the fact that elephants are larger than dogs may interfere with correct ideas concerning the relative size of the numbers. Also, be sure the



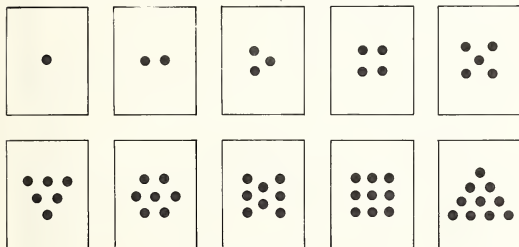
Picture Side



Numeral Side

objects are placed in a scattered arrangement, since in their early experiences pupils should count the items in each group to find the number represented.

Pattern Number Cards. These are cards picturing groups of representative objects (such as dots, circles, X's, and the like) in the standard patterns taught in NUMBERS WE NEED. There should be one card for each of the patterns shown below with the corresponding numeral, in the correct style, on the reverse side of each. (There are other acceptable pattern arrangements but those shown below are considered standard in NUMBERS WE NEED.)



Standard Patterns

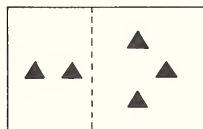
Picture Cards for Number Facts. The illustration below shows a kind of card that can be used in the early stages for teaching the addition fact $3 + 1 = 4$. With one such card for each of the addition facts, children can look at the cards and tell "put-together" number stories. Cards should be added to practice sets only as fast as the corresponding addition facts have been developed to the point where children are capable of this kind of reaction.



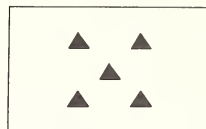
The card shown below is for use with the subtraction fact $4 - 1 = 3$. The one chipmunk is shown leaving the original group of four to suggest the idea of take away.



Pattern Cards for Number Facts. For these cards, pictures of circles, triangles, or squares may be drawn on oak tag or cut out of construction paper and pasted on oak tag. There should be one card for each whole story taught. For example, the card illustrated below is for the facts $2 + 3 = 5$ and $3 + 2 = 5$ when using one side and for the facts $5 - 2 = 3$ and $5 - 3 = 2$ when using the other side of the card.



Addition Side



Subtraction Side

For the addition facts, the child must "think" the groups together with the card and the parts first in one position and then in the reverse position, since it is impossible to have action with pictured, stationary items. In the case of the subtraction facts, the teacher shows first the whole group, then bends back part of the group so that only the other part of the group may be seen.

Number Dictionary Chart

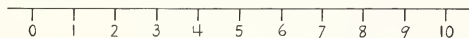
One device that is useful in teaching children to read the numerals is a number dictionary chart, such as that shown below. This chart may be drawn on the chalkboard or may be made on a large piece of cardboard or on a window shade to be hung on the wall. It should be started when the need arises and added to only as new numbers are introduced. (If you use a completed chart, cover up that part of the chart which has not yet been developed.) The pictures in the first column may be attractively colored. If preferred, colored illustrations from magazine advertisements may be used. The second column contains the numerals. The third column may be added later, as the number words are taught.

	1	one
	2	two
	3	three
	4	four
	5	five
	6	six
	7	seven
	8	eight
	9	nine
	10	ten

Number Dictionary Chart

Number Line

From oak tag cut a strip 1" wide and 11" long. Mark the strip as shown below. This *Number Line* may be used in conjunction with the *Number Strips* described in the next column, or may be used independently to discover addition and subtraction facts (counting forward and counting backward) and for other purposes as well.

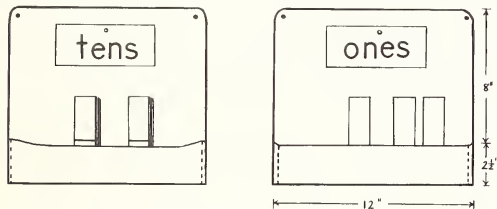


Additional sections of the *Number Line* may be made in the same manner, to extend the line through any decade—ultimately as far as 100.

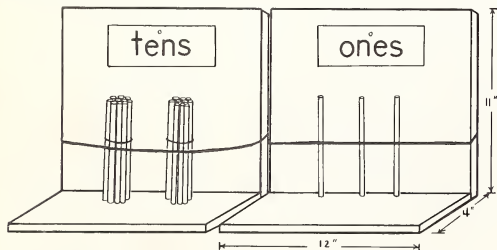
A *Class Number Line* can be made in a similar way and placed along the chalk tray or at the top of the chalkboard. For this, use oak tag that is 2" to 3" wide and have the numerals on the *Number Line* spaced 2" to 3" apart.

Number Pockets

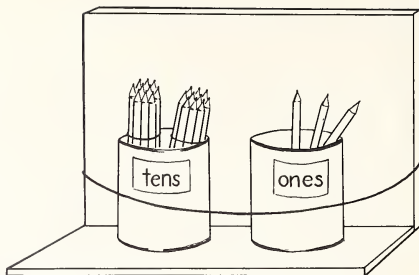
There are many good methods of making number pockets for use with bundle-numbers. One good method is to use oilcloth or plastic in making individual pockets similar to those illustrated below. For work with tens and ones, make two pockets as shown; for work with hundreds, tens, and ones, make three pockets. Of course, pockets must be made in larger quantities if several small groups are to work with bundle-numbers simultaneously. The pockets may be thumbtacked to the bulletin board with cards to label the pockets "ones" and "tens" tacked in the positions shown in the picture.



Boards nailed together to make stands similar to those in the picture below also make convenient number pockets. Large rubber bands placed over the upright portion of each stand will serve to hold the bundles and single sticks that are used in representing numbers. Labels may be thumbtacked to the stands in whatever location is convenient.



Discarded cans that have been washed and made free of sharp edges may also be used for number pockets. Use gummed labels for marking the cans. The cans may be kept separate in use on a table or along a chalk tray or fastened to a wooden stand as shown at the top of the next column.

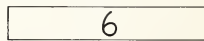


Pencils, dowels, 3" by 5" index cards, or colored splints purchased for the purpose from school-supply houses may be used in representing numbers. Make ten 10-bundles using elastic bands to hold the groups of *tens* together. Have on hand about twenty single objects to represent *ones*.

You may want to consider substituting a reading pocket chart (such as the *Ginn Card Holder* which may be purchased from Ginn and Company) for the pockets described above. In this case, make sure that the pockets are large enough to accommodate 10-bundles. In some cases this may be accomplished by inserting only one or two of the objects that make up a 10-bundle, allowing the others, held by the elastic band, to be suspended outside of the pocket.

Number Strips

You will want to make several sets of *Number Strips*. For every set cut 10 strips from oak tag, making each strip 1" wide and of progressively increasing lengths: 1", 2", 3", 4", . . . , 10". Divide and mark off one side of each strip (except the 1-strip) into 1" squares. On the other side of each strip write the appropriate numeral. Both sides of a 6-strip are shown below.



NOTE: You may prefer to cut the above from blocks of wood $\frac{3}{4}$ " to 1" square on the end and of proper lengths, scoring 1, 2, or 3 sides of each block into squares and writing the numeral on the fourth side of the block.

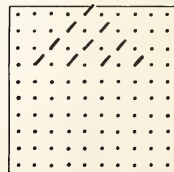
By combining two *Number Strips* end-to-end and comparing them with a third *Number Strip* of equal length, addition facts may be discovered or verified. *Number Strips* may also be used appropriately in a similar way for discovering component parts of numbers and for work with subtraction facts.

Instead of using two *Number Strips* placed end-to-end in comparison with a third *Number Strip*, you may wish to use them with the *Number Line* described at the top of the left column.

Peg Board

Obtain a piece of acoustical tile or a piece of Masonite with drilled holes, cut in such a way that there will be 10 rows of holes with 10 holes in each row. Also obtain 100 kindergarten pegs for use with the board, or substitute matchsticks or dowel rods (lollipop sticks or the like).

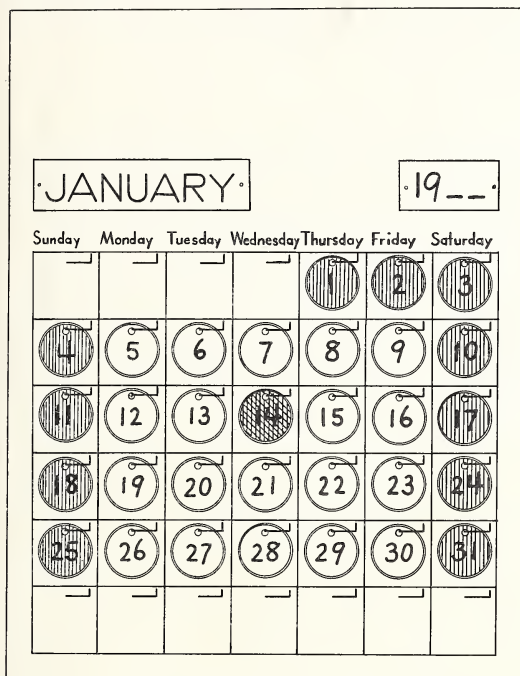
Children may use the board to show standard patterns for groups as large as 10, or to show other patterned arrangements for such groups. By grouping and regrouping pegs, children may discover or verify component parts of groups, addition facts and subtraction facts, etc.



By placing pegs in rows of 10, the *Peg Board* can be used in much the same way as the *Flexible Hundred-Board* to show the tens-and-ones structure of numbers.

Perpetual Calendar

Secure a piece of $\frac{1}{4}$ " plywood that is about 20" wide and about 30" high. Rule off the board in squares about $2\frac{1}{2}$ " on a side as shown below. The days of the week may be lettered permanently



on the board. Twelve oak-tag strips with the names of the months on them should be prepared and the appropriate strip thumbtacked on the board each month. The year likewise should be written on an oak-tag strip and thumbtacked to the board so that it can be changed when necessary.

Center and screw a small L-hook near the top of each square so that a round, metal-rimmed key tag about 2" in diameter will be within the outline of the square when hung from the L-hook, as indicated in the diagram.

Obtain 93 round, metal-rimmed key tags about 2" in diameter (31 each of three different colors). Write the numerals 1 through 31 on each set.

Hang key tags from the L-hooks in the proper squares for the current month. Use key tags of one color for the days school is in session; tags of another color for the days school is not in session; and for the current day, use the third color.

The space at the top can be used for a variety of purposes. You may want to mount on construction paper and thumbtack there the "Picture of the Month" (or of the week or day). The pictures may be drawn by pupils or cut from a magazine. The space at the top also may be reserved for listing names of children who have birthdays on a particular day, for special events of the day, and the like.

Games

It is important that the place and use of games in arithmetic instruction be considered thoughtfully. Almost without exception, the following games, and most arithmetic games in general, provide practice only. Thus, they are to be used in the same way that other forms of practice are used—after underlying understandings have been developed and established. If used in this way, games provide an opportunity for varied forms of practice in settings which appeal to the children. Even then, an excessive or unwise use of arithmetic games may direct attention and emphasis away from the all-important thing being practiced, which is *mathematical* in nature, and center the child's interest on competition, reward, or other undesired and perhaps even harmful goals.

As the games are referred to in the teaching lessons, you will find that in some cases the directions must be modified to correspond to the material being taught. Thus, if a game is written in such a way that cards with numerals through 10 are to be used, and your pupils have worked only with numerals through 5, you will want to change the directions for the game to suit the progress of your pupils. Later on, when your children have worked with numerals through 10, the game may be referred to again and you will be able to reintroduce it without change for more advanced practice.

Recognizing whole stories

Ask and Draw

Prepare a deck of 24 cards (for sums and minuends not exceeding 6) or a deck of 36 cards (for sums and minuends to 7). On each card write one of the four facts which make up a whole story (omitting, of course, the doubles $2 + 2$, $4 - 2$, and $3 + 3$, $6 - 3$). For example, these facts would appear on four different cards:

$$4 + 1 = 5 \quad 1 + 4 = 5 \quad 5 - 1 = 4 \quad 5 - 4 = 1$$

Shuffle and deal 6 cards to each of 3 players. Place the remaining cards face down in the center of the table. Pupils should make whole-story books of the facts held, place them face down on the table, and then take turns asking one another for a card needed to complete or add to partial whole-story books remaining in their hands. The pupil asked must give up the requested card if he holds it. A player continues to ask for cards from either of the other two players until he is unsuccessful in getting the card he requested. Then he draws a card from the pile and the next player begins asking for cards. As whole-story books are completed, they should be placed face down on the table. The player completing the most books during the game is the winner.

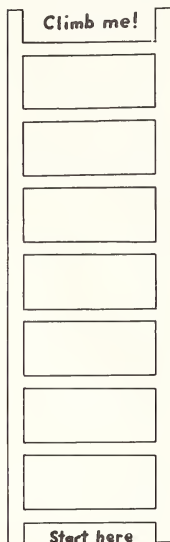


Climb the Ladder (1)

On a sheet of oak tag, draw a ladder with 8 rungs (more or less if desired) as shown at the right. Cut 4 to 6 circular markers from different colors of construction paper and use them to record individual or team progress up the ladder from rung to rung.

To play the game with 4 to 6 children, show the first child the pattern side of one of the *Ginn Pattern Number Cards* (or construct similar cards according to the instructions on page 13 of this *Teachers' Edition*). Show the card *very briefly* and have the child respond by telling "how many." If he answers correctly, he may put his marker on the first rung of the ladder. Continue from child to child in this way, showing the standard patterns in random order. Whenever a child responds correctly, he moves his marker to the next higher rung on the ladder. The winner is the one whose marker reaches the top of the ladder first.

To play the game with two teams of children, use one marker for each team. The *Pattern Number Cards* should be shown alternately to the successive members of each team. The Captain of each team moves his team's marker one rung up the ladder each time a member of his team answers correctly. The winning team is the one whose marker reaches the top of the ladder first.



Recognition of sizes of unpatterned groups

CLIMB THE LADDER (2)

Play the game as described under *Climb the Ladder (1)*, but use the *Ginn Picture Number Cards* (or construct similar cards according to the directions on page 12 of this *Teachers' Edition*) with the numeral folded back out of sight in each instance. Expose the cards for a longer period of time than you did in *Climb the Ladder (1)*, since the child must determine the sizes of groups of objects in scattered rather than patterned arrangements.

Component parts

CLIMB THE LADDER (3)

From the set of *Ginn Pattern Cards for Number Facts* (see page 10 or page 13 in this *Teachers' Edition*) select those cards in which the size of the total group does not exceed 5, 6, or 7—depending upon how far you have progressed in your study of component parts. Use only the addition side of each card (the side that shows two groups separated by a dashed line). Play the game according to either of the two methods described under *Climb the Ladder (1)*. When a given card is shown to a child, he must respond by telling the size of the total group and the pair of parts seen in the representation. The response might be, "I see 6. The parts are 4 and 2 or 2 and 4."

Pairs of addition facts

CLIMB THE LADDER (4)

Use the same sides of the *Ginn Pattern Cards for Number Facts* that were used above in playing *Climb the Ladder (3)*. As before, the size of each total group should not exceed 5, 6, or 7—depending upon how far you have gone in your systematic study of pairs

of facts. When a card is exposed, the child is to respond with a pair of addition facts, such as: $3 + 2 = 5$ and $2 + 3 = 5$.

Pairs of subtraction facts

CLIMB THE LADDER (5)

Use the subtraction side of the *Ginn Pattern Cards for Number Facts* (see page 10 or page 13 of this *Teachers' Edition*), but, as before, select only those cards in which the size of the total does not exceed 5, 6, or 7—depending on how far you have gone in your systematic study of pairs of facts. As a card is shown and folded the pupil is to respond with a pair of subtraction facts such as $4 - 1 = 3$ and $4 - 3 = 1$:

Number facts

CLIMB THE LADDER (6)

Play the game according to either of the two methods described under *Climb the Ladder (1)*. Use a set of cards on which you have written combinations (without answers) for addition facts only or for subtraction facts only, or for both addition and subtraction facts mixed—depending upon how far you have proceeded in your systematic study of the number facts. They may be written either horizontally or vertically and may include sums or minuends of 5, 6, or 7. If you have studied the principles of adding 1 to a number or subtracting 1 from a number, you may also include appropriate facts with sums or minuends as large as 10. When a combination is shown to the child, he is to respond by giving just the answer or by making a complete statement of the fact. There is some advantage in insisting that the responses be made in the latter form.

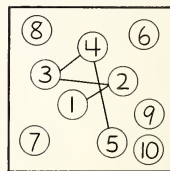
Serial order of numerals

Connecto

Each of 4 to 6 players writes the numerals 1 through 10 on a sheet of paper, spreading the 10 numerals all over the sheet in a random order and then drawing a ring around each of the numerals.

Children then exchange papers according to a prearranged plan (for example, each child may pass his paper to the child on his left) and on signal begin connecting the ringed numerals in proper serial order. The first child finished calls "Connecto" and is the winner if he has made no mistake.

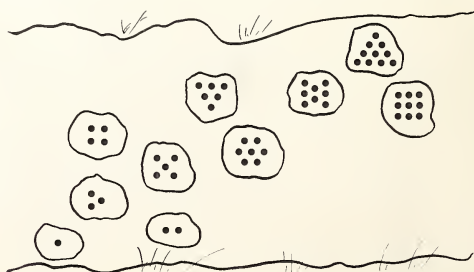
The game may be varied by using any 10 numerals in serial order (for example, the numerals 21 through 30, 46 through 55, etc.). All children should use the same 10 numerals, of course, in any instance.



Serial order of groups to 10

Cross the River (1)

On a large sheet of oak tag draw the two irregular banks of a river as shown below. Cut ten "stones" from construction paper



and put a standard pattern for the numbers 1 through 10 on each stone, one pattern to a stone. Scatter the stones in irregular order from one bank of the river to the other.

Divide the class into two teams. Have the first member of Team 1 try to cross the river by starting at the 1-stone and "jumping" from stone to stone in proper sequential order until he reaches the 10-stone on the opposite side of the river. One point is scored for his team if he crosses the river correctly. Then have the first member of Team 2 try to cross the river. Continue in this fashion, alternating members from each team, until all have participated. Change the position of the stones from time to time. The team with the greater number of points is the winner.

Serial order of numerals 1 through 10

CROSS THE RIVER (2)

On each of 10 "stones" put a numeral from 1 through 10. Scatter the stones between the river banks and play as in *Cross the River (1)* above.

Serial order of number words through ten

CROSS THE RIVER (3)

On each of 10 "stones" put a number word from *one* through *ten*. Scatter the stones between the river banks and play as in *Cross the River (1)*.

Serial order of numerals beyond 10

CROSS THE RIVER (4)

On each of 10 "stones" put a numeral from any selected 10-numeral sequence (for example, 25 through 34). Scatter the stones between the river banks. Be certain the children know the starting and ending numerals in the sequence and play as in *Cross the River (1)*. Use different numeral sequences from time to time.

Serial order of numerals by 2's through 20

CROSS THE RIVER (5)

On each of 10 "stones" put one of the numerals in the series when counting by 2's through 20 (2, 4, 6, 8, . . . , 20). Scatter the stones between the river banks and play as in *Cross the River (1)*, changing the positions of the stones from time to time.

Serial order of numerals by 10's through 100

CROSS THE RIVER (6)

On each of 10 "stones" put one of the numerals in the series when counting by 10's through 100 (10, 20, 30, . . . , 100). Scatter the stones between the river banks and play as in *Cross the River (1)*, changing the positions of the stones from time to time.

Selecting numerals in order of increasing size

CROSS THE RIVER (7)

On each of 10 "stones" put one of the numerals from the counting series (for example, 13, 21, 27, 45, 52, 57, 63, 78, 84, 96). Scatter the stones between the river banks. Be sure the children know the starting and ending numerals. Then have them play by "hopping" from one stone to the one of next higher value in the number series. Use different groups of 10 numerals from time to time, also changing the positions of the stones between the banks.

Matching standard group patterns

Dominoes (1)

Cut from oak tag 55 "dominoes," each 1" by 2", and divide each in halves with a line. Draw two dot pictures on each domino card using the standard patterns shown on page 13 of this

Teachers' Edition making sure that the complete set of dominoes includes all of the following combinations:

1	2	3	4	5	6	7	8	9	10	2	3	4
5	6	7	8	9	10	2	3	4	5	6	7	8
2	3	4	5	6	7	8	9	10	2	3	4	5
3	4	5	6	7	8	9	10	2	3	4	5	6
4	5	6	7	8	9	10	2	3	4	5	6	7
5	6	7	8	9	10	2	3	4	5	6	7	8
6	7	8	9	10	2	3	4	5	6	7	8	9
7	8	9	10	2	3	4	5	6	7	8	9	10
8	9	10	2	3	4	5	6	7	8	9	10	2
9	10	2	3	4	5	6	7	8	9	10	2	3
10	2	3	4	5	6	7	8	9	10	2	3	4
2	3	4	5	6	7	8	9	10	2	3	4	5
3	4	5	6	7	8	9	10	2	3	4	5	6
4	5	6	7	8	9	10	2	3	4	5	6	7
5	6	7	8	9	10	2	3	4	5	6	7	8
6	7	8	9	10	2	3	4	5	6	7	8	9
7	8	9	10	2	3	4	5	6	7	8	9	10
8	9	10	2	3	4	5	6	7	8	9	10	2
9	10	2	3	4	5	6	7	8	9	10	2	3
10	2	3	4	5	6	7	8	9	10	2	3	4

To play, all dominoes are turned with the pattern-side down and are mixed well. Each of 2 to 4 players chooses 5 to 7 dominoes. The player with the highest double starts the game by placing his domino face up in the center of the table. Each player in turn tries to match the end of one of his dominoes with the end of either the last domino played or the end of one played earlier that is "open." If he cannot do so, he draws one domino at a time from the pile until he finds one he can play. If the pile is depleted, he loses his turn. The first player to use all his dominoes wins. If no one can make a further play, the player having the fewest number of dots showing on all his remaining dominoes wins.

Matching group sizes

DOMINOES (2)

Cut from oak tag 55 "dominoes," each 1" by 2", and divide each domino in halves with a line. As before, draw a dot picture on each half of the domino. Use the same 55 group combinations as in *Dominoes (1)*, but vary the way in which you show a given number by its dot picture. For example, 5 might be shown as: $\begin{smallmatrix} \bullet & \bullet & \bullet \\ \bullet & & \bullet \end{smallmatrix}$, $\begin{smallmatrix} \bullet & \bullet & \bullet \\ & \bullet & \bullet \end{smallmatrix}$, or $\begin{smallmatrix} \bullet & \bullet & \bullet \\ & \bullet & \bullet \end{smallmatrix}$.

Play as in *Dominoes (1)*. Note, however, that in this variation the ends of the dominoes are not matched on the basis of standard patterns. Rather, matching is done on the basis of groups that have the same size, or number of dots, regardless of pattern or arrangement. This involves a different number ability than that required in *Dominoes (1)*.

Recognizing group sizes

Fish (1)

Cut 10 "fish" out of construction paper. On each put a non-patterned dot picture of one of the groups from 1 through 10.



Attach a paper clip to each fish and put the fish in a "pond" (cardboard box or other suitable container). Make a fishing rod from a pole to which is tied a length of string with a magnet fastened on the end.

Divide the players into two teams. Have the first player on Team 1 fish in the pond until he has pulled out one of the fish. The player then must look at the dot picture on his fish and tell

"how many." If he responds correctly, he scores a point for his team. In any event, he throws his fish back into the pond and the first member of Team 2 has his turn fishing. Play continues in this way until all members of both teams have had a turn. The team with the higher total score is the winner.

If desired, just two players may fish, each taking a specified number of turns on an alternating basis. The child with the higher score at the end of the series of turns is the winner. Three or more children could play on this same basis if desired.

Recognizing standard group patterns

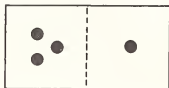
Fish (2)

Play the game as described in *Fish (1)*, but use fish having standard-pattern dot pictures for groups through 10 (see page 13 of this *Teachers' Edition* for the standard patterns).

Recognizing pairs of component-parts stories

Fish (3)

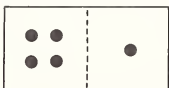
Play the game as in *Fish (1)*, but use fish having representations such as the one at the right. The players respond by telling a pair of stories about a group and its parts.



Recognizing pairs of addition facts

Fish (4)

Play the game as in *Fish (1)*, but use fish having representations such as the one at the right. The players respond by telling a pair of put-together stories about the dot picture.



Recognizing pairs of subtraction facts

Fish (5)

Play the game as in *Fish (1)*, but use fish having representations such as the one at the right. The players respond by telling a pair of take-away stories about the dot picture.



Recognizing answers to number combinations

Fish (6)

Play the game as in *Fish (1)*, but use fish having addition combinations (without answers), or subtraction combinations, or both, written either horizontally or vertically. The players respond by telling the answer to the combination or by making a complete statement of the fact, using the combination and its answer.

Matching non-patterned groups and numerals

Fish with Bait

The following variation of the game *Fish* will be enjoyed by the children and serves a different instructional purpose. This game is played best by 2 to 4 children individually rather than as a team game.

Use the materials for *Fish (1)* plus a "bait can" (a tin can or small cardboard box) containing 10 small circles or squares with a numeral from 1 through 10 on each.

In this variation the first player starts by drawing one of the small circles from the bait can. Then he fishes in the pond until a fish is caught. If the fish caught shows the grouping that matches the numeral on the bait, the child keeps the matching pair. If the grouping on the fish does not match the numeral on the bait, the fish must be thrown back into the "pond." Then the next child plays, and so on.

A child who has matched his bait with a fish on any given turn then draws another piece of bait when his next turn comes. A child who has not matched his bait with a fish on a given turn keeps the same bait for his next turn until it is matched. The player who finally has caught the most fish by matching correctly with the pieces of bait is the winner.

Matching numerals and number pictures

Follow Me



Use the numeral side only of the Ginn Pattern Number Cards, or prepare ten cards of your own so that each of the numerals 1 through 10 will appear on one card only. Distribute these cards one to a child. Also prepare cards to represent the numbers 1 through 10 in picture form (several for each number) and distribute them to the rest of the children. Call a numeral and ask the child who has it on a card to march around the room holding the card aloft. All those who have cards representing that number march behind him.

Recognizing addition facts having a given sum

Guess Again (1)

A pupil-leader says he is thinking of a put-together story that has a certain answer (for example, 5). The other pupils try in turn to guess what the put-together story might be. If the first pupil does not guess the story the leader had in mind, the leader turns to the next pupil and says, "Guess again." Play continues in this way until a pupil guesses the leader's put-together story, in which case the one doing so becomes the leader.

Recognizing subtraction facts having a given remainder

GUESS AGAIN (2)

Play the game as in *Guess Again (1)*, but use take-away stories in place of put-together stories.

Recognizing addition and subtraction facts having a given answer

GUESS AGAIN (3)

Play the game as in *Guess Again (1)*, but use both put-together stories and take-away stories in mixed order.

Recognizing component parts of a given group

GUESS AGAIN (4)

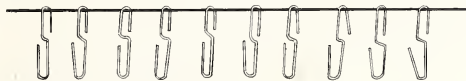
Play the game as in *Guess Again (1)*, but have the pupil-leader think of the component parts of a group of an announced size. For example, the leader might mention 4 while thinking the parts 3 and 1.

Serial order of numerals to 10

Hooked (1)

Prepare 10 "fish" like those used for the *Fish* game. On each fish put a numeral from 1 through 10. Play according to either

of the methods described in *Fish (1)*. However, as each fish is caught, the pupil catching it must place it in proper serial order on a paper-clip fishhook suspended from a string stretched horizontally along the chalkboard. Each fish placed on its proper hook scores 1 point for the team or player.



HOOKED (2)

Serial order of number words one to ten

Play the game in the same way as *Hooked (1)*, but this time use 10 fish, each having written on it a number word from *one* through *ten*.

HOOKED (3)

Serial order of numerals to 20 when counting by twos

Play the game as in *Hooked (1)*, but use 10 fish, each having written on it a numeral in the sequence to 20 when counting by twos (2, 4, 6, . . . , 20).

HOOKED (4)

Serial order of numerals to 100 when counting by tens

Play the game as in *Hooked (1)*, but use 10 fish, each having written on it a numeral in the series to 100 when counting by tens (10, 20, 30, 40, . . . , 100).

HOOKED (5)

Serial order of numerals to 100

Prepare as many as 100 fish, each having one of the numerals from 1 to 100 written on it. Select any 10 fish in sequence (for example, those numbered 40 through 49, or 65 through 74, or 83 through 92). Place in the "pond" the 10 fish selected and play the game as in *Hooked (1)*. Vary the game by using fish having some other sequence of numerals.

Matching groups and numerals

I Want to Meet

Use the numeral side only of the *Ginn Pattern Number Cards*, or prepare ten cards of your own so that each of the numerals 1 through 10 will appear on one card only. Distribute these cards, one to a child. Then give to each of the other children a number of objects (such as pegs, cards, acorns, etc.) making sure that each of the numbers 1 through 10 is represented at least once. Call out a numeral (for example, 4) and ask the child who holds the card having that numeral on it to go to the front of the room and hold his card for all to see. The child then says, "I want to meet all the fours." Children with four objects hold them up, someone counts them, and those who hold the correct number of objects join the holder of the 4-card. They then return to their seats, and the game goes on with other numerals called for. From time to time, change the number of objects held by each child.

Recognizing sums for addition combinations

It (1)

All players sit in a circle. The one who is "It" stands in the center of the circle and gives an addition combination (for example, $3 + 2$). The players are assigned numerals in such a way that each numeral occurs twice. Thus, if "It" calls " $3 + 2$," the two children assigned "5" try to change places before "It" can occupy one of their places. The number of players who may participate will be determined by the addition facts studied thus far in your arithmetic program.



Recognizing remainders for subtraction combinations

It (2)

All players sit in a circle, with a child who is "It" in the center. "It" calls out a subtraction combination (for example, $4 - 1$). The players are assigned numerals in such a way that each numeral occurs twice. Thus, when "It" calls " $4 - 1$," the two children assigned "3" try to change places before "It" can occupy one of their places. The number of players who may participate will be determined by the subtraction facts studied thus far in your arithmetic program.

Recognizing answers to addition and subtraction combinations

It (3)

Play the game as in *It (1)* or *It (2)*, but permit the child who is "It" to call out either an addition combination or a subtraction combination.

Recognizing a specified number of sounds, motions, etc.

Knock, Knock

Have 10 children seated at the chalkboard at the front of the room. Assign numerals randomly from 1 through 10 to these children. Have another child stand in front of these children with his back to them.

Point to one of the seated children who is to say, "Knock, knock."

The child standing is to say, "Who is there?"

The child to whom you pointed is to say, "I am (knock, knock, . . .)" as he knocks on the chalkboard as many times as the numeral assigned to him indicates.

The child who is standing may say, "You are 5."

If correct, the child standing takes the place of "5" and another child comes to the front of the room and play continues.

You may vary the game by using tapping, or the like, in place of knocking.

Also, the game may be adapted for the sense of touch or sight in place of the sense of sound. For example, one child may tap the child who is standing a specified number of times on the back. Or, one child may make a motion (for example, raising his hand above his head) a specified number of times and the child who is "It" must tell how many times the action took place.

Using ordinals

Moving Man

Have several pupils line up across the front of the room, making sure each one knows his ordinal position in the line. Then choose a pupil, the "Moving Man," to stand at the back of the room facing away from the line. The "Moving Man"

uses ordinals in giving directions to pupils to change places; for example, he might say, "The third pupil change places with the sixth." The "Moving Man" must try to keep from moving a child more than once as long as possible. Whenever he does move a child more than once, he takes that pupil's place and the latter becomes the "Moving Man."

The game may also be played with the "Moving Man" giving directions similar to the following: "Pupil Number 2 change places with Pupil Number 5."

Matching dot totals on dominoes with numerals

Number Bingo (1)

From the set of dominoes prepared for *Dominoes (1)*, select the 25 having no more than 10 dots in all on the face of the domino. Also include an extra 1 and 1 domino and an extra 2 and 1 (or 1 and 2) domino. Draw 9 rectangles on each of two cards and insert numerals according to the scheme shown below. Then, turn the dominoes face down and have two players take turns drawing dominoes. If the total number of dots on a domino is equal to the numeral on the pupil's card, he covers it with the domino; otherwise, he places it in a discard pile which is to be mixed and reused if nobody wins by covering all squares before the original pile is depleted.

3	10	6
8	2	5
7	4	9

4	9	7
8	3	5
6	2	10

Recognizing answers to addition combinations

NUMBER BINGO (2)

Draw 9 rectangles on each of two cards and insert addition combinations according to the scheme shown below. (Make the rectangles like those on the cards for *Number Bingo (1)* if you wish to state the addition combinations vertically rather than horizontally.) Make 24 small cards, each the size of one of the rectangles you have drawn. Put the numeral 2 on three of these cards, the numeral 3 on five of the cards, the numeral 4 on seven of the cards, and the numeral 5 on nine of the cards. Turn the numeral cards face down and have two pupils play the game as in *Number Bingo (1)*. In this instance a pupil covers an addition combination with the appropriate small numeral card which gives the combination sum.

You may wish to make other large and small cards to include addition combinations having sums as large as 6 or 7.

$3 + 2 = \underline{\quad}$	$3 + 1 = \underline{\quad}$	$1 + 4 = \underline{\quad}$
$1 + 3 = \underline{\quad}$	$2 + 3 = \underline{\quad}$	$1 + 2 = \underline{\quad}$
$1 + 1 = \underline{\quad}$	$4 + 1 = \underline{\quad}$	$2 + 2 = \underline{\quad}$

$2 + 3 = \underline{\quad}$	$1 + 1 = \underline{\quad}$	$1 + 3 = \underline{\quad}$
$3 + 1 = \underline{\quad}$	$4 + 1 = \underline{\quad}$	$3 + 2 = \underline{\quad}$
$1 + 4 = \underline{\quad}$	$2 + 2 = \underline{\quad}$	$2 + 1 = \underline{\quad}$

Recognizing answers to subtraction combinations

NUMBER BINGO (3)

Prepare appropriate cards similar to the kind used for *Number Bingo (2)*, but adjusted so that subtraction combinations appear in the rectangles on the big cards and the answers to subtraction combinations appear on the small covering cards. Play the game as in *Number Bingo (2)*.

Recognizing standard-group patterns

Numberland (1)

Use construction paper to make a copy of the playing-board shown at the bottom of the next page. Also make (a) a spinner with the numerals 1 through 4 on the face of the spinner; (b) a set of 10 cards for the numbers 1 through 10, each shown in its standard pattern; (c) markers of different colors to be used by the 3 or 4 pupils who will play the game.

To play, shuffle the set of 10 pattern cards and place them face down in a pile. The first player places his colored marker at "Start Here" on the playing-board. He draws the top card from the pile and tells the number represented by the standard-pattern group. If he answers correctly, he then spins the spinner to determine how many spaces he may move on the playing-board. If he answers incorrectly, he may not spin the spinner or move the marker. Each of the other players takes his turn in a similar manner. Play continues in this manner and the first player who advances his marker to Numberland is the winner. When the pile of 10 cards has been depleted, they are reshuffled and placed in a pile for use again.

Various supplementary moves to be made by a pupil's marker are shown on the playing-board. All but the direction "Answer 2 Cards" are obvious in their implication. When a pupil's marker lands on "Answer 2 cards," he must draw two cards on his next turn and answer each correctly in order to spin the spinner and enter Numberland.

If a player is less than 4 spaces from Numberland, he does not have to spin the exact number of remaining spaces to enter Numberland.

Recognizing number words

NUMBERLAND (2)

Use the equipment described under *Numberland (1)* except that each of the 10 cards should be made to contain a number word from one to ten. Play the game as in *Numberland (1)*.

Recognizing answers to addition facts

NUMBERLAND (3)

Use the equipment described under *Numberland (1)*, except that each of the cards in the set should be made to contain an addition combination ($2 + 2 = \underline{\quad}$, $3 + 1 = \underline{\quad}$, etc.) Play the game as in *Numberland (1)*.

Recognizing answers to subtraction facts

NUMBERLAND (4)

Play as in *Numberland (1)* but use a set of cards having a subtraction combination ($4 - 1 = \underline{\quad}$, $3 - 2 = \underline{\quad}$, etc.) on each.

Recognizing answers to addition and subtraction facts

NUMBERLAND (5)

Play as in *Numberland (1)*, but combine the sets of cards used for *Numberland (3)* and *Numberland (4)*, shuffling them well before starting to play.

Old Hat (1)

Make two sets of ten cards each. On the cards in one set, show dot pictures for the numbers 1 through 10 in standard patterns, one to a card. On the cards in the other set, write the numerals 1 through 10, one to a card. Mix both sets of cards together and then withdraw one card at random, leaving a card from one of the original sets with no matching card from the other set. Deal the 19 cards to each of two to four players. To begin the game, the first player draws a card from the hand of one of the other players. He then attempts to pair cards in his hand, matching any pattern card with the corresponding numeral card to form a book of two cards. Each book is discarded face up in front of the player. The second player then picks a card from the hand of one of the other players, and makes and discards a book if he can. The play continues from one player to the next in this way until all possible books have been completed and one child holds the odd card which has none to match it. This child is the "Old Hat."

Matching non-patterned groups and number symbols

Old Hat (2)

Play the game as in *Old Hat (1)*, this time using one set of ten cards containing non-patterned groups for numbers through 10 and another set of ten cards containing number symbols from 1 through 10.

Matching group patterns and number words

Old Hat (3)

Play the game as in *Old Hat (1)*, but substitute cards containing number words for the numeral cards.

Matching non-patterned groups and number words

Old Hat (4)

Play the game as in *Old Hat (1)*, but change the cards so that pupils pair cards containing non-patterned groups with cards containing the number words *one* through *ten*.

OLD HAT (5)

Play the game as in *Old Hat (1)*, but have pupils pair cards containing number symbols with cards containing number words.

Matching two-place numerals and bundle representations

OLD HAT (6)

Play the game as in *Old Hat (1)*, but substitute for the cards described there a set of 10 or more cards each of which has a two-place numeral written on it, and another set of an equal number of cards each of which has on it a "bundle picture" corresponding to a numeral in the first set of cards.

Matching two-place numerals and ten-and-ones statements

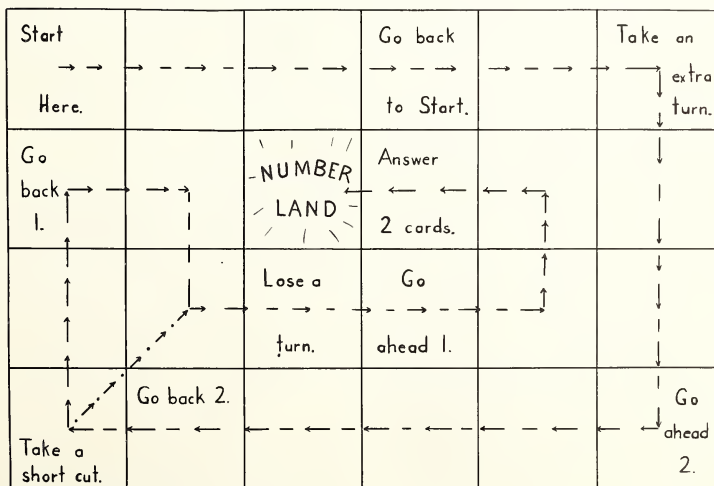
OLD HAT (7)

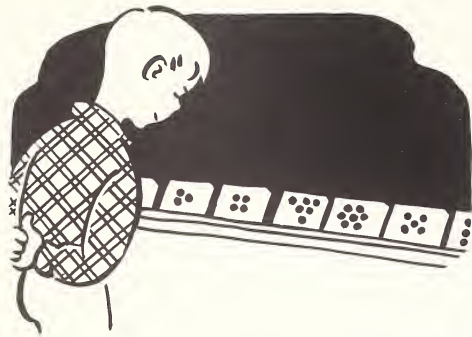
Play the game as in *Old Hat (1)*, but substitute for the cards described there a set of 10 or more cards having a two-place numeral written on each, and another set of an equal number of cards having a corresponding tens-and-ones statement (for example, 2 tens and 7 ones) written on each.

Number facts

OLD HAT (8)

Play the game as in *Old Hat (1)*, but use the following two sets of cards: (a) one set of cards with an addition combination (without answers), or a subtraction combination, or a mixture of addition and subtraction combinations, written on each, either horizontally or vertically, involving sums of 5, 6, or 7 depending upon how far you have progressed in your instructional program; (b) an equal number of cards each of which has written on it either the answer to one of the combinations in the first set or a complete statement of fact corresponding to one of the combinations in the first set. If just the answers are written on the cards in this set, some of the cards may be duplicates since some of the number combinations in the first set may require the same answer and there must be a matching card in the second set for each card in the first set.





Out of Order (1)

Use the standard-pattern side of the *Ginn Pattern Number Cards* or prepare a set of similar cards showing the standard patterns for groups through 10. Line the cards up in order on the chalk tray and ask a pupil to leave the room. Move one of the cards so that it is out of order. Then ask the pupil to return and try to put the sequence back in order. If he does so correctly, he may choose someone to leave the room while he changes a card.

Standard patterns in sequential order

OUT OF ORDER (2)

Use the numeral side of the *Ginn Pattern Number Cards*, or prepare a set of 10 similar cards showing the numerals from 1 through 10. Play the game the same way as in *Out of Order (1)*.

Serial order of numerals through 10

OUT OF ORDER (3)

Prepare a set of 10 cards showing the numerals 2 through 20 by twos. Play the game as in *Out of Order (1)*.

Serial order of numerals to 20 by twos

OUT OF ORDER (4)

Prepare a set of 10 cards showing the numerals 10 through 100 in sequence by tens. Play the game as in *Out of Order (1)*.

Serial order of numerals through 100 by tens

OUT OF ORDER (5)

Prepare a set of 100 cards showing the numerals 1 through 100. Select any 10 cards which are in sequence (for example, the cards 20 through 29, or the cards 45 through 54, or the cards 72 through 81, etc.) and play the game as in *Out of Order (1)*.

Serial order of numerals through 100

Matching standard patterns with numerals and number words

Over Orange (1)

Prepare the following three sets of cards: (a) a set of 10 blue cards containing dot pictures of the numbers 1 through 10 in standard patterns; (b) a set of 10 orange cards containing the numerals 1 through 10; (c) another set of 10 orange cards containing the number words *one* through *ten*.

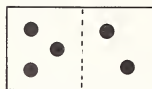
Several pupils seated around a table are to collect books of three cards each by matching two orange cards containing a numeral and corresponding number word with a blue card containing the related standard pattern. First shuffle and deal all the blue cards, then shuffle and deal all the orange cards from both sets. A player starts by saying "Over orange," which is the signal for each pupil to pass one orange card, if he has one, to

the player on his right. Pupils then make and place on the table as many correctly matched books as possible containing two orange cards and one blue card. Play continues, with pupils giving the signal "Over orange" in turn, until a player goes out by using up all the cards in his hand. Players receive one point for each correct book and the player going out receives two additional points. The pupil with the most points wins.

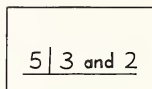
Matching statements of parts with a parts grouping

OVER ORANGE (2)

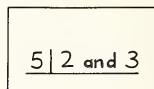
Play the game as in *Over Orange (1)*, but make the set of blue cards show dot pictures of parts groupings for total groups as large as 5 (or 6 or 7) and make the sets of orange cards show parts statements written in two ways. One book of such cards is illustrated below.



(Blue Card)



(Orange Card)

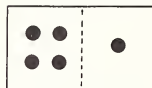


(Orange Card)

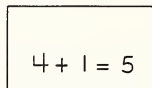
Matching pairs of addition facts with dot pictures

OVER ORANGE (3)

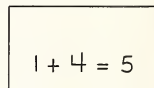
Play the game as in *Over Orange (1)*, but make the set of blue cards show addition groupings for totals as large as 5 (or 6 or 7) and make the sets of orange cards show related addition facts.



(Blue Card)



(Orange Card)



(Orange Card)

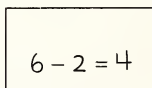
Matching pairs of subtraction facts with dot pictures

OVER ORANGE (4)

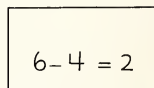
Play the game as in *Over Orange (1)*, but make the blue cards show subtraction groupings for totals as large as 5 (or 6 or 7) and make the orange cards show related subtraction facts.



(Blue Card)



(Orange Card)

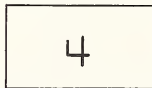


(Orange Card)

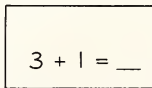
Matching pairs of addition combinations with their answers

OVER ORANGE (5)

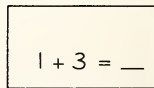
Play the game as in *Over Orange (1)*, but make the blue cards show answers to addition facts with sums as large as 5 (or 6 or 7) and make the orange cards show the related combinations.



(Blue Card)



(Orange Card)



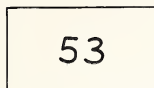
(Orange Card)

Matching bundles, tens-and-ones statements, and 2-place numerals

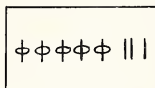
OVER ORANGE (6)

Play the game as in *Over Orange (1)*, but make the blue cards show selected 2-place numerals, make one set of orange cards

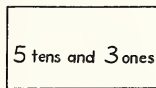
show related bundle representations, and make the other set of orange cards show tens-and-ones statements. One book of such cards is illustrated below.



(Blue Card)



(Orange Card)



(Orange Card)

Forming standard patterns

Patterns

Supply each child with a *Picture Number Card* (see the directions for making these cards on page 12 in this *Teachers' Edition*). The child places these cards numeral side up on his desk, and then puts on each card the corresponding number of objects in standard-pattern arrangement from his box of materials (see *Number Box* on page 12 in this *Teachers' Edition*). He scores one point for each card he gets right.

Postman (1)

Give each of 5 children a card with a numeral which is his "house number." Another child is selected as postman. He is given a large number of cards or envelopes with groups of marks on them in pattern form corresponding to the house numerals (to 10 only). He must deliver the envelopes to the right "houses." If he makes a mistake, the child at whose house the mistake is made becomes the new postman.

Matching patterns with numerals

POSTMAN (2)

Arrange 25 chairs in 5 rows of 5 chairs each. These are to represent houses. Also have a supply of blank envelopes available.

Divide the class into two teams and have the children on Team A give directions for the children on Team B to execute. For example, the first child on Team A might say to the first child on Team B, "Take this letter to the third house on the second street." (The streets are ordered from left to right as the children face them; the houses, from front to back.) If the letter is delivered to the proper house, Team B receives one point. Next, the second child on Team A gives a direction to the second child on Team B, and so on until all children have participated. Then the play is reversed, beginning with the first child on Team B giving a direction to the first child on Team A. At the end of the game, the team with the higher score is the winner.

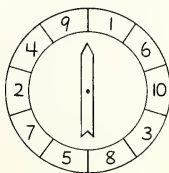
Recognition of ordinal positions

Spin It (1)

Make a spinner of the kind shown at the right, using one color of oak tag for the face of the spinner and another color for the pointer. Fasten the pointer to the face with a common paper fastener.

Prepare 10 file cards 3" by 5" so that non-patterned dot pictures of the numbers 1 through 10 appear one to a card. Put the cards in random order along the chalk tray with the blank sides of the cards facing the players. Put the numerals 1 through 10 in order on the chalkboard above the randomly arranged cards.

Divide the class into two teams. Have the first child of Team A spin the pointer and then select from the chalk tray the card with the same numeral above it as the one to which the pointer pointed,



Recognizing group sizes

turn the card over to see the dot picture, and then tell "how many." A correct response scores a point for his team. The card is replaced on the chalk tray and the first player of Team B takes his turn. The game continues in this way, alternating from one team to the other, until all players have participated. The team with the higher total score is the winner. The random order of the cards on the chalkboard may be changed at any time during the course of play if desired.

The game may also be played by individuals rather than teams. In this case, two or more players would compete against each other, alternating trials for a specified number of turns. The player with the highest total score wins.

Recognizing standard patterns

SPIN IT (2)

Play the game as in *Spin It (1)*, but use cards on which there are dot pictures in standard patterns for the numbers 1 through 10.

Recognizing addition and subtraction answers

SPIN IT (3)

Play the game as in *Spin It (1)*, but use cards on which there are addition combinations (without answers), or subtraction combinations, or a mixture of addition and subtraction combinations, written either horizontally or vertically. Pupils respond by giving answers or by giving complete statements for the combinations.

Varied number relations

Who Am I?

One of 6 to 10 children is "It" and stands in the center of the group. He thinks of a number (for example, 6) and then gives a "clue" to the other children in the group to see if they can determine the number selected. The child who is "It" might give one of the following clues:

"I am the number that comes next after five. Who am I?"

"I am the number that comes just before eight when counting by twos. Who am I?"

"I am the number whose parts are 3 and 3. Who am I?"

"I am the number that is 4 plus 2. Who am I?"

The nature of the clue or clues will depend upon the number relationships known to the children. For a large number, such as 47, the clue might be, "I am the number that is 4 tens and 7 ones. Who am I?"

After the child who is "It" has given his clue, he calls on one of the children in the group to answer the question, "Who am I?" If the child called upon answers correctly, he becomes "It" and selects a new number and new clue. If the child called upon cannot answer correctly, another child is asked the question, "Who am I?" If no one can respond correctly, the child who is "It" gives another clue to the number he has thought of. Be certain that all children in the group have reasonable opportunity to be called upon and have turns at being "It."

Matching group patterns and number symbols

The Wizard (1)

Cut a board to which file cards (3" by 5") may be tacked in two vertical columns of 10 cards each, as shown in Fig. 1 of the diagram on page 24. Install terminals along the sides of the board as shown. Also, install the indicated socket and flashlight bulb. Wire the *Wizard* on the back of the board as shown in Fig. 2 of the diagram. Make the lead wires long enough to reach the topmost terminals easily.

Make one set of 10 cards on which show dot pictures for the numbers 1 through 10 in standard patterns, one to a card. Tack

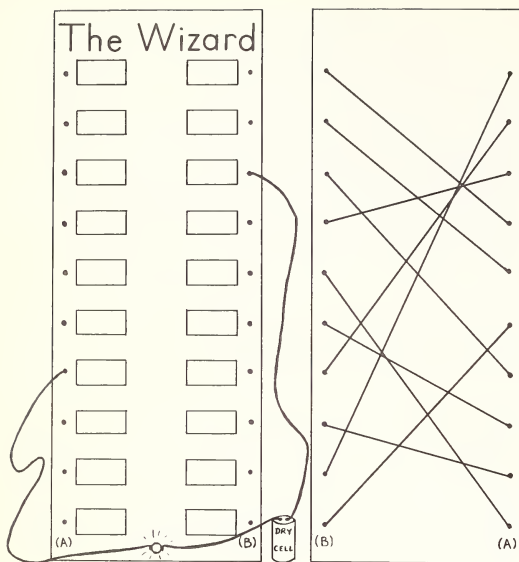


Fig. 1

(Wiring on reverse side)

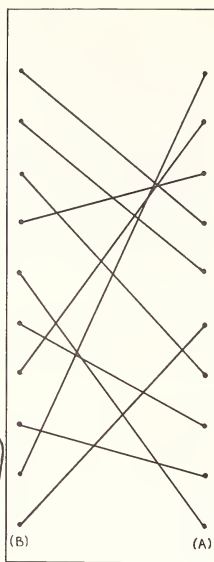


Fig. 2

these cards in random order in a column opposite the left-hand terminals. Make another set of 10 cards on which are written the numerals from 1 through 10. Tack these cards in a column opposite the right-hand terminals. The position of each card in the second column in relation to its matching card in the first column is determined by the wiring diagram shown in Fig. 2.

To operate the *Wizard*, place the left-hand lead wire from the light socket on the terminal for a chosen card in the first column. Then place the right-hand lead wire from the dry cell on the terminal for the matching card in the other column. If the card with the correct numeral has been chosen for the card with the standard pattern in the first column, there will be a complete electrical circuit and the flashlight bulb will light. If the cards in the two columns are incorrectly matched by the player, the bulb will not light.

The *Wizard* may be used in many different ways, some of which are described below.

a. Divide the class into two teams, each with a Captain. Have the Captain of Team A select a standard pattern from the first column and place the left-hand lead wire on the terminal for that card. Then have the first player of Team B select the matching card in the second column and place the right-hand lead wire on its terminal. If the bulb lights, Team B scores 1 point. If the bulb does not light, Team B makes no score. The Captain of Team A then chooses another standard-pattern card and the second player of Team B attempts to find the matching card. The game continues in this manner until all players of Team B have participated and their total score is determined. Then a similar procedure is followed, with the Captain of Team B making the selections from the first column of cards and the players of Team A trying to match his selections in turn from the second column. The total score is found for Team A, and the winning team is the one with the greater total score.

b. Have two children compete against each other. First one child selects a card from the first column and the other child

tries to match it, scoring 1 point if he succeeds. Then the other child selects a card and the first child tries to match it, and so on. Play continues in this way for an agreed upon number of turns. The child with the higher score wins.

c. Have just one child use the *Wizard* as a self-checking form of practice.

Be sure to change the wiring pattern from time to time. Otherwise some children will learn to pick certain matching pairs of terminals without paying any attention to the cards.

Matching group patterns and number words

THE WIZARD (2)

Play as in *Wizard* (1), but in the second column put cards with the corresponding number words through *ten* instead of numeral cards.

Matching numerals and number words

THE WIZARD (3)

Play as in *Wizard* (1), but in the first column put cards with the numerals through 10 and in the second column put cards with the corresponding number words through *ten*.

Matching bundle pictures and 2-place numerals

THE WIZARD (4)

Play as in *Wizard* (1), but in the first column put cards with tens-and-ones bundle pictures. In the second column put cards with corresponding 2-place numerals. From time to time replace some of the cards with new ones.

Matching 2-place numerals and tens-and-ones statements

THE WIZARD (5)

Play as in *Wizard* (1), but in the first column put cards with 2-place numerals. In the second column put cards with corresponding tens-and-ones statements (such as 2 tens and 3 ones). From time to time replace some of the cards with new ones.

Matching numerals with others in serial order

THE WIZARD (6)

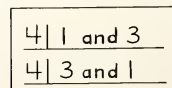
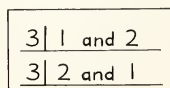
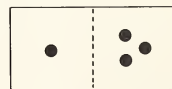
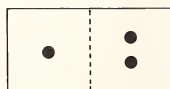
Play as in *Wizard* (1), but in the first column put cards with numerals, or cards with incomplete sequences (for example, 7, —, 9; or 53, —, 55). In the second column put cards with numerals which come before the numerals, after the numerals, or between the sets of numerals on the corresponding cards in the first column.

The cards in the two columns could be varied from time to time and should also be designed for use with series of numerals through 100 by twos.

Matching representations and pairs of component-parts statements

THE WIZARD (7)

Play as in *Wizard* (1), but in the first column put cards with dot pictures of component parts of groups as large as 5, 6, or 7, as illustrated by the two top cards below. In the second column put cards with pairs of statements of component parts on each card as shown by the two bottom cards. Vary the order of the cards in each column from time to time.



THE WIZARD (8)

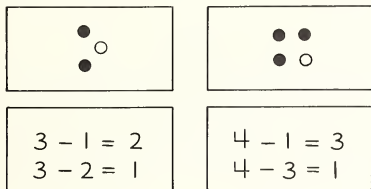
Matching representations and pairs of addition facts

Play as in *Wizard (1)*, but prepare the cards for the first column as prepared for the first column in *Wizard (7)*. In the second column put cards with pairs of addition facts on each card. If you wish, make representations vertically rather than horizontally. Do the same with the pairs of addition facts.

Matching representations and pairs of subtraction facts

THE WIZARD (9)

Play as in *Wizard (1)*, but in the first column put cards with dot pictures of subtraction facts for minuends as large as 5, 6, or 7 as illustrated by the two top cards below. In the second column put cards with pairs of subtraction facts on each card as shown by the two bottom cards. If you wish, make statements of fact vertically instead of horizontally.



Matching addition and subtraction combinations with answers

THE WIZARD (10)

Play as in *Wizard (1)*, but in the first column put cards with number combinations (for example, $3 + 2 = \text{---}$). These may be all addition combinations, all subtraction combinations, or addition and subtraction combinations mixed. Each may be stated horizontally or vertically or in mixed form. Also, the cards may involve addition combinations with 3 addends, written horizontally or vertically, or both. Sums and minuends will be restricted to 5, 6, or 7 in general, unless you are including work with the ideas of "1 more" and "1 less," in which case sums and minuends may be as large as 10. In the second column put cards with answers to the combinations used in the first column or, if preferred, put cards with complete statements of fact (for example, $3 + 2 = 5$).

SPECIAL NOTE. If only answers are used in the second column, more than one card in the first column may be matched with the same card in the second column. Therefore, the wiring of the *Wizard* must be adjusted so that wires will connect the different terminals in the first column with the one terminal in the second column that answers them all.

Zooks

Recognizing standard patterns

Use the set of 55 dominoes that were prepared for *Dominoes (1)*. Pupils deal all the dominoes face down to 2, 3, or 4 players who then alternate in turning over their cards one at a time and placing them in a center pile. If it has been decided previously that dominoes containing the standard pattern for 5 will be collected, the first pupil to call "Zooks" when any such pattern is exposed may collect that domino and all beneath it in the center pile. A pupil who calls "Zooks" at the wrong time must return whatever dominoes he has to the bottom of the center pile. The player with the most dominoes when no further play is possible wins.

Vary the game from time to time by changing the standard pattern to be collected.

Films and Filmstrips

Films

These carefully selected 16 mm motion-picture films are listed in alphabetical order by title, with an indication of the main source of each film.

Any film that is contemplated for showing should be previewed and studied carefully by the teacher so that it will be used most appropriately and effectively.

ARITHMETIC FOR BEGINNERS. Bailey Films Inc., 6509 DeLongpre Avenue, Hollywood 28.

Part I (1 reel): Addition and subtraction facts having sums and minuends of 2 and 3.

Part II (1 reel): Addition and subtraction facts having sums and minuends of 4 and 5.

Part III (1 reel): Addition and subtraction facts having sums and minuends of 6.

Let's Count. Coronet Films, 65 E. South Water St., Chicago 1.

Meaning of Plus and Minus, The. Encyclopaedia Britannica Films Inc., 1150 Wilmette Avenue, Wilmette, Ill.

Number System, The. Encyclopaedia Britannica Films Inc., 1150 Wilmette Avenue, Wilmette, Ill.

Teen Numbers, The. Young America Films Inc., 18 E. 41st St., New York 17.

What Is Four? Young America Films Inc., 18 E. 41st St., New York 17.

Filmstrips

It is especially important for the teacher to preview and study a filmstrip carefully before using it with children in the classroom. All of a filmstrip need not be shown at one time, and in some instances certain frames in the filmstrip may be omitted.

ARITHMETIC EXPERIENCES. American Educational Projections Corp., 1319 Vine Street, Philadelphia. These two titles from a series of 6: *Words for Comparison; More or Less.*

BASIC NUMBERS SPEED-O-STRIP SERIES. Society for Visual Education Inc., 1345 W. Diversey Parkway, Chicago 14. These three titles from a set of 23: *Number Recognition—Digits: (1) One and Two Digits; Addition Combinations: (10) Fifteen Easiest Combinations; Subtraction Combinations: (14) Fifteen Easiest Combinations.*

Count 1, 2, 3, 4, 5. The Filmstrip House, 347 Madison Avenue, New York 17. Groups and sequence of numerals to 10.

How to Tell Time. Popular Science Publishing Company, Audio-Visual Division, 353 Fourth Avenue, New York 10. This one title from a set of two: *Part I—Hour and Half-Hour, The.*

PRIMARY ARITHMETIC SERIES. Popular Science Publishing Company, Audio-Visual Division, 353 Fourth Avenue, New York 10. These two titles from a series of six: *A Number Family in Addition* (Addition facts with sums of 7); *What Numbers Mean* (Number groupings to 10).

USING AND UNDERSTANDING NUMBERS. Society for Visual Education Inc., 1345 W. Diversey Parkway, Chicago 14. These four titles from a set of five: *Using and Understanding Numbers, 1-5; Using and Understanding Numbers, 5-9; Learning about Using Pennies, Nickels, and Dimes; Learning to Tell Time.*

USING NUMBERS. Encyclopaedia Britannica Films Inc., 1150 Wilmette Avenue, Wilmette, Illinois. A series of 16 titles: *Counting to 5; Counting to 10; Reading Numbers to 10; Writing Numbers to 10; Counting by 10's to 30; Counting by 10's to 50; Counting by 10's to 80; Counting by 10's to 100; Counting from 10 to 15; Counting from 15 to 20; Counting from 20 to 40; Counting from 40 to 100; Reading Numbers to 50; Reading Numbers to 100; Working with Numbers to 100; Writing Numbers to 100.*

WORK AND PLAY WITH NUMBERS. Eyegate House Inc., 330 W. 42nd Street, New York 18. These seven titles from a series of eight: *Addition and Subtraction Concepts* (Sums and minuends to 5); *Arithmetic Concepts* (Quantitative vocabulary, etc.); *Time and Money* (Time on the hour; pennies, nickels, dimes); *We Learn Numbers—Part I* (Number groupings, etc., 1-5); *We Learn Numbers—Part II* (Number groupings, etc., 6-10); *Work and Play with Numbers, 5 and 6; Work and Play with Numbers, 7 and 8.*

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NOTE. The teacher is encouraged to read *The Arithmetic Teacher* regularly for helpful articles other than those cited above which relate in whole or part to suggestions on arithmetic instruction at the first-grade level.

READINESS LESSONS and TEACHING THE PRIMER

The Program for the First Half Year

THE PROGRAM FOR THE FIRST HALF YEAR

Now that we have explained the theory underlying our program—our conception of arithmetic and our views concerning good teaching, economical and interested learning, and appropriate materials of instruction—now that we have done this, we are ready to summarize for you the program for the first half year.

As you read the learning objectives that will provide the quick overview for you, there are two important points to bear in mind:

1. The objectives as listed on page 30 are for the first half year and not just those for which the *Primer* provides experiences. In the first place, such objectives as "Ability to use understandingly many comparison and quantitative terms . . . such as *more, bigger, . . .*" can be emphasized more fully through materials in the classroom than through pictures in a work-text. Secondly, a complete program must extend, through oral experiences with real and representative objects, beyond the limits provided for in the pictured and written content of the work-text. These concrete experiences help the pupil to meet his present needs and aid in developing readiness for the more abstract presentations in subsequent work-texts. Accordingly, from time to time, in connection with the Extensions suggested for a *Primer* page, you will be reminded to make use of oral activities in order to maintain objectives of the term or in Looking-Ahead activities to prepare for written experiences to come later in the program.

2. Although the items in the list on page 30 are referred to as learning objectives, it is essential to keep in mind that some of the pupils will not be able to achieve these goals in the first half year. Thus, you must interpret these objectives broadly as you guide the individual pupils in their early number work.

Learning Objectives for the First Half Year of Systematic Instruction

1. Ability to use understandingly many comparison and quantitative terms other than numerals—such as *more*, *bigger*, *tallest*, *middle*, and so on*
2. Ability to read the numerals to 10 (and the number words *one* through *five*) and to understand the place of each numeral in the series
3. Ability to count by rote to 50* and the ability to enumerate for purposes of identification and reproduction
 - a. orally with concrete materials to 50*
 - b. in association with written numerals to 10
4. Extended understanding of the numbers to 10 through comparison of the sizes of groups and immediate recognition of patterned groups
5. Ability to use ordinals
 - a. orally through *tenth**
 - b. with written experiences through *fifth*
6. Ability to write the figures through 5
7. Understanding of the coins cent, nickel, dime, as well as the symbol ¢
8. Ability to deal with time on the hour (both identification and reproduction)
 - a. orally to 12*
 - b. in association with written numerals to 10
9. Ability to identify some common measuring instruments, with use and some knowledge of the occasions when they are used (for example, ruler, scales)
10. Some understanding of the component ideas of the numbers 2 through 5,—introductory to the more specific number combinations for these numbers in addition and subtraction
11. Discovery of the addition and subtraction facts for the numbers 2 through 5 (mastery of some facts for all pupils and through sums and minuends of 5 for more capable pupils); and the beginning of work on generalizing when the result is *one more* or *one less**
12. Ability to identify halves of single objects (when the equal parts are shown)

*Starred items indicate objectives specifying content not covered entirely in the *Primer* pages, either (1) because the content does not lend itself to experiences with printed material or (2) because experiences with manipulative materials are suggested for the oral development to serve as readiness for later written experiences.

13. Ability to deal with simple problem situations by using real and representative objects*
14. The disposition to use and the habit of using number in practical ways*
15. The possession of desirable emotionalized responses with respect to arithmetic—attitudes, appreciations, and values*

The Nature of the Objectives

The objectives listed above indicate the general direction of the instruction during the first half year. These objectives are made more specific in the introductory material that precedes the work of each of the four periods of instruction. Further, in the period introductions, you will find each objective discussed. The discussions at those points will better serve your needs than if we were to elaborate on the objectives now. However, if you would like to explore the objectives more at this time, turn to *Teachers' Edition* pages 32–33, 42–43, 73–74, and 103–104.

At this juncture it is important to recall two points regarding the first half year of systematic instruction. As stated before, the half year in question may be the kindergarten or the first or the second term of Grade 1 or even the first term of Grade 2. However, the program including the *Primer* is well within the abilities of beginners in Grade 1, and it is recommended for adoption and use in the first term. Next, *systematic* instruction does not mean *formal* instruction. The latter adjective carries implications of an undesirable nature—strict, rigid, overly serious, inflexible, even downright unpleasant. Of course we (and we include you) want nothing of this kind. Systematic instruction means that we have a job to do and we make plans to do it. You teach to accomplish certain purposes, as set forth in the list of objectives above; but you can have a good time, and so can your pupils. *Unsystematic* instruction can be formal. Systematic instruction can, and should, be informal in the sense that children enjoy learning what they are expected to learn.

Schedule of Instruction

As has been explained above, the work of the first half year has been divided into four instructional periods, each lasting from two to five weeks. The chart opposite indicates the general schedule of instruction. The objectives for the half year are here expanded in order to give recognition to certain distinctions in the objectives. The four columns represent the four periods into which the half year has been divided.

OBJECTIVES FOR THE FIRST HALF YEAR

	1st Period	2d Period	3d Period	4th Period
Comparison of sizes and use of quantitative terms	✓	✓	✓	✓
Reading numerals and number words and understanding the place of each numeral in the series		[W] numerals to 6 [W] words to three	[W] numerals to 10 [W] words to five	maintain
Counting and enumeration a. rote counting b. identification c. reproduction	[O] to 15	[O] to 30 [W] to 6	[O] to 50 [W] to 10	maintain
Comparison of the sizes of groups and immediate recognition of groups	[O] unpatterned through 3 [O] patterned through 3	[W] patterned through 6	[W] patterned through 10	maintain
Use of ordinals	[O] through third	[O] through fifth	[O] through tenth [W] through fifth	maintain
Writing figures		[W] through 3	[W] through 5	maintain
Understanding coins (cent, nickel, dime) and ¢ symbol		[O] cent, nickel, dime [W] cent (1¢), nickel (5¢)	[W] cent (1¢), nickel (5¢), dime (10¢)	maintain
Telling time on the hour			[O] to 12 o'clock [W] to 10 o'clock	maintain
Measuring (identifying instruments and situations)			[O] with real materials	[W] identifying measuring instruments and situations
Understanding of component parts of numbers			[O] through 5	[W] through 5
Discovery of addition and subtraction facts and some intelligent mastery; with beginning work on generalizing about 1 more and 1 less			[O] through 5	[W] for 2 through 5
Identifying fractions			[O] halves of an object	[W] halves of an object
Dealing with simple problem situations by using real and representative objects	✓	✓	✓	✓
Using number in practical ways	✓	✓	✓	✓
Possession of desirable emotionalized responses with respect to arithmetic	✓	✓	✓	✓

[O] Items marked with this symbol specify content that is not covered entirely in the *Primer* pages, either because it does not lend itself to the printed page or because experiences with manipulative materials are suggested for the oral development that should precede later written experiences.

✓ indicates that definite attention is given to the objective in this period of instruction.
[W] Items marked with this symbol indicate written experiences in connection with work on the *Primer* pages or in other printed material.

SYSTEMATIC INSTRUCTION FOR THE FIRST HALF YEAR

	PAGE
Discussion of the First Period of Instruction	32
Readiness Lessons for the <i>Primer</i>	36
Discussion of the Second Period of Instruction	42
Text Pages and Lesson Plans, <i>Primer</i> Pages 1-26	46
Discussion of the Third Period of Instruction	73
Text Pages and Lesson Plans, <i>Primer</i> Pages 27-54	75
Discussion of the Fourth Period of Instruction	103
Text Pages and Lesson Plans, <i>Primer</i> Pages 55-80	105

Discussion of the First Period of Instruction

We have divided the first half year of systematic instruction into four periods, each period lasting from two to five weeks. According to this plan, the *Primer* is not introduced until the second of the four periods. For the second period through the fourth, the *Primer* itself provides the basis for planning your teaching. In the first period, we think it best not to use the *Primer* at all.

We recommend that you postpone use of the *Primer* to the second period of instruction regardless of when you start this program. If you begin the program in the kindergarten or in the first half of Grade 1, there will be much to do to get your class organized and to get your pupils ready to do what is required in the first *Primer* lessons. In this case, you may well lengthen the pre-*Primer* period to four or five weeks. If you begin the program in the second half of Grade 1 or in Grade 2, you can shorten the pre-*Primer* period to two weeks or so.

This *Teachers' Edition* is written on the assumption that you will use the *Primer* before the second half of Grade 1. If you defer its introduction until later, you can readily adapt our suggestions for teaching as you see fit.

Getting Started

You know pretty well what you will need to do in the first weeks with pupils who have had little or no school experience. Among these things we suggest that you will want to

- get well acquainted with each child as an individual;
- establish a classroom climate—warm, pleasant, and interesting—that is favorable to learning;
- familiarize your pupils with the conditions of group instruction;
- provide experiences in following directions;
- furnish much practice in using crayon and/or pencil in performing tasks on paper.

The suggestions above, you will note, are not limited to the purposes of teaching arithmetic. Rather, they are general in their application. Moreover, you understand each of them well enough to require no explanation or justification from us.

Arithmetic Objectives for the First Period of Systematic Instruction*

- (1) Ability to use understandingly words for comparison of sizes and many common quantitative terms other than numerals

*The objectives of this teaching period provide the oral developmental experiences with manipulative materials which are readiness for many of the written experiences to come later in the program.

- (2) Ability to count by rote to 15 and the ability to enumerate orally with manipulative materials to 15 (for both identification and reproduction)
- (3) Extended understanding of the numbers 1 to 3 through comparison of the sizes of groups and immediate recognition of unpatterned and patterned groups of 2 and of 3
- (4) Ability to use orally the ordinals *first*, *second*, *third*
- (5) Ability to deal with simple problem situations by using real and representative objects
- (6) The disposition to use, and the habit of using, number in practical ways
- (7) The possession of desirable emotionalized responses with respect to arithmetic—attitudes, appreciations, and values

Discussion of Objectives

The list of objectives above is not intended to place limits upon your teaching in the first period; it is minimal rather than exhaustive. For example, we do not include the reading of any of the numerals, deferring instruction on this objective to the second period of instruction. Yet, it may well be that many of your pupils will already be able to recognize several of the numerals, or that you may want to teach some of them.

Objective 1. The development of a functional oral vocabulary is an important aspect of our systematic program of arithmetic instruction. For this reason, we have prepared vocabulary lists of comparison and quantitative terms other than numerals for each instructional period to help you in providing for this development. These lists have been more or less arbitrarily broken into 4 groups to make it easier for you to give attention to the words of the period. If the words appeared in one long list, it would be easy to lose track of many of the words.

Each list contains quantitative terms and related expressions that you are most likely to feel children will need in their arithmetic work. No specific suggestions are given here regarding the manner of the teaching beyond pointing out two rather obvious phases of the process: first, the necessity of a clear idea for each term; and second, the association of the correct word for that idea. We feel that you may wish to develop some of the oral vocabulary earlier than the instructional period in which it is listed. In other instances you may wish to develop some of the oral vocabulary later than where it is listed. For this reason you may want to look at all of the word lists at this time (see also *Teachers' Edition* pages 42, 73, and 103) in order to work out the best plan in terms of your local situation. In any event, the lists serve mainly as a *guide* for you and certainly may be modified as you wish. We have tried to anticipate the needs children will

have for certain words or terms and list them in advance of the instructional period where they will be used most extensively.

The following 19 words of the reading vocabulary of the *Primer* are not included in the four lists: *all, and, apples, are, away, birds, children, dogs, five, four, hats, in, is one, take, three, trucks, two, wagons*. Also, because the regular instructional program provides for systematic experiences with certain other cardinal numbers (beyond *three*), certain ordinal numbers (as *first, second, and so on*), and certain of the process words (as *put together*), these have not been included in the separate vocabulary list for any period.

Oral Vocabulary List for First Instructional Period

In the list below, the daggers indicate words that definitely will be needed in the oral discussion of the following period as you take up the *Primer* lessons with your pupils.

†above	†few	†bongs
†after	†figure	†off
†ahead	†front	†on
†around	†group	†over
back	†high	†penny
†before	†large	†ring
†behind	†last	†round
†below	†least	save
†beside	†less	†sell
†between	†little	†small
†big	†low	†some
†bottom	†many	†spend
†buy	†money	†squares
†cent	†more	
change	†most	†together
†circles	†much	†top
†coin	†next	†triangles
†count	†nickel	†under
†down	†number	†up

Objective 2. Investigations have shown that most children when they enter Grade 1 can count by rote, that is, they can say the memorized number words in sequence, far beyond the limit suggested here. It is important, however, to check on the ability of each child in this respect. There is no necessity for your pupils to be able at this time to count beyond 15; they will have no need to do so in this first period of instruction. Nor will they be likely to have any need to count to 50 much before the end of the term. We think it better to assure mastery at this time of the number span only to 15, leaving extensions to 30 and 50 for later development.

Identifying a total group by enumeration will probably be within the abilities of your pupils when they come to you. That is, they should be able to find out and tell how many in the whole group. But, in order to develop this skill, you should check and provide opportunities for those who cannot identify orally groups of objects to 15. Our limit, 15, is of course arbitrary, but it is advanced enough both for instructional purposes and for most practical activities at this time.

Reproducing orally groups of objects to 15 will probably have been achieved by most of your pupils before you see them; but check and teach as necessary. Later on, the ability will be extended as far as need be. Remember that reproduction is the activity required to satisfy the direction: **Give me six pencils or Put nine books on the table.** It differs from identification which gives the answer to **How many crayons are in this box?**

In connection with this objective, try also for the identification and reproduction of groups of sounds (such as taps, bells, and so on).

Objective 3 is intended to call attention to the group idea, in contrast to the serial idea, of numbers. In the course of the first period, your pupils should learn about the sizes of groups through 3 by comparing a group of 3 things with a group of 2 things, finding that the group of 3 is one more than the group of 2, and similarly comparing a group of 2 things with 1 object. Pupils also learn to identify at a glance in this period groups of real objects through 3 and the following regularly structured representative number patterns for groups of 2 and of 3: (for 2) • • or : (for 3) : • •

Objective 4—understanding ordinals through *third*—requires no comment beyond this: Ordinals are naming numbers; they identify the place of single objects in a series and they do not refer to totals (the cardinal idea of numbers). Practically all children know the meaning of *first* and *second* when they enter school. Of course in this period the work with ordinals is oral and prepares a foundation for written experiences later in the program.

Objective 5—ability to deal with problem situations—calls for performing such tasks as:

Put enough more chairs with those at the table (perhaps 2) **so that we shall have five.**

Give a book to each of these children (perhaps 6).

Too many of the windows are open (perhaps 4). **All we need is two. Close the others.**

In these problem situations, your pupils will use real objects. They will also learn to perform corresponding tasks which are set up more or less artificially by using representative objects (such as milk-bottle tops) for manipulation. The purpose here is to teach children to substitute representative objects for real ones.

Objective 6—the use of number in practical ways—is listed for this period, as it will be for the other three periods of instruction of the half grade, to assure stress on the social aim of arithmetic. Be alert to the occurrence of number in classroom activities and encourage your pupils both to be sensitive to it and to employ the arithmetic they know in dealing with it.

Objective 7, listed also for the other three periods of instruction of the term, has reference to desirable emotionalized responses toward arithmetic. It is scarcely possible to exaggerate the essential nature of this objective. Perhaps its importance is best apprehended when one notes the effects of unfavorable attitudes toward arithmetic. Witness the uncertainty of many high-school students when they deal with quantitative situations—uncertainty, yes, but also embarrassment, insecurity, and frustration. Not being confident of their ability to deal with the arithmetic of the sciences which they may be expected to study, they try to avoid sciences or they come to dislike them as much as they dislike arithmetic. Witness, too, the discomfort of many adults when they must deal arithmetically with practical situations.

This state of affairs is to be contrasted with what one observes in most school beginners: they actually like number work! They love to count, sometimes almost to the point of its becoming a mania. And they get real satisfaction out of learning new things about numbers and number processes. This attitude we must seek to preserve and strengthen at almost any cost. Indifference toward the subject and open distaste for it come from failure—from failure to understand what is taught, from inability to perform the skills presented, and from inability to see any usefulness in the ideas and processes learned. Is it any wonder, then, that we specify, as one of the principal objectives in arithmetic, desirable emotionalized responses toward the subject, and that we believe this objective should be recognized from the very beginning of instruction?

Inventorying Ideas and Skills

Beginning with the second period of instruction in the half year, you have in this *Teachers' Edition* lesson-by-lesson teaching suggestions. This is possible because, with the introduction of the *Primer*, there is a definite scheme of sequential lessons in the *Primer* pages themselves. For the first period of instruction, however, there is no such printed matter in the hands of the pupils and, as we may have implied, we doubt that there can be any, in view of the wide diversity of conditions from school to school and the wide range of abilities within each class. In one sense—and then only in a limited sense—the purpose of the pre-*Primer* period is to reduce this diversity and range of abilities and to establish, as it were, a common ground for instruction.

For the first period of systematic instruction, then, we have organized teaching suggestions around the objectives listed on page 32. First, though, you will need to inventory your pupils' abilities (see the chart and suggestions below), in order to make your teaching more effective and more specifically directed to individual needs. Whether you will want to have

stands and can recognize groups of 2, but not of 3; and she does not understand the use of *third*.

The value of such a summary chart is self-apparent. By reading across the chart, you can tell at a glance the specific shortages of each child. By reading down each column, you can select the children for group instruction organized around their common deficiencies.

Now, how do you get the data for the inventory chart? Obviously you cannot use group tests (as can be done later on) but must secure the needed information from the children individually. It is not necessary, however, for you to do everything yourself. Instead, you can use your *more capable pupils* as helpers who can then report what they find in testing others.

Counting by Rote to 15

At some convenient time when you are working with the class as a whole, ask, **Who knows how to count to 20?** Choose some child who volunteers and have him count aloud. Note errors and points of hesitation. Repeat with several other children until you have identified four or five children who give every evi-

INVENTORY CHART					
Pupil's Name	Rote Counting to 15	Identification to 15	Reproduction to 15	Understanding and Recognition of Groups to 3	Ordinals through third
<i>Adams, Jane</i>	OK	OK	OK	2	first, second
<i>Allen, Joe</i>	12	9	8	OK	OK
<i>Bates, Fran</i>	OK	OK	OK	OK	OK
<i>Becker, Ed</i>	8	5	5	2	OK
<i>Crane, Frank</i>	10	4	4	OK	first
<i>Dale, Alice</i>	OK	12	9	OK	OK

separate arithmetic class periods of fifteen or twenty minutes a day, you will have to decide. But we think it preferable to postpone them until you start with the *Primer*. Meanwhile, you can take five minutes or more at times throughout the day to do what is to be done.

By suggesting an elastic and a somewhat irregular schedule, we do not imply any lack of systematic planning or recommend anything like casual teaching. We do not mean that you wait for things to happen,—things that you can use to advantage. Though the programing is informal, you still have definite ideas and skills to test and teach.

Above is a model of a chart which you can make to enter the results obtained in checking your pupils on their knowledge of *Objectives 2 through 4*. *Objective 1* is best checked as occasions for the use of comparison and quantitative terms like *as many* as occur, or are made to occur, during the day. *Objective 5* is reserved for direct instruction, and *Objectives 6 and 7*, being very general in character, are subject to continuous but nevertheless definite observation.

Fran Bates is the most capable of the six children in our hypothetical group. As shown by the OK in each column, she is already, at the outset, able to do all the five things listed for achievement during the period. Ed Becker, on the other hand, is pretty limited in his abilities. He can count by rote only to 8, can identify by enumeration groups only as large as 5, and so on. Jane Adams needs help at but two of the five points; she under-

dence of having mastered the skill. They can be your helpers; and it is on this account—to make sure of their ability—that you ask the children to go beyond the period limit of 15 in rote counting.

Say: **I wish we had time for all of you to show all of us how well you can count, but we haven't. So, I'll tell you what we can do. You can count for each other. Harold (a helper) can take Edith and Tom and May, one at a time, and you can count for him. Then he can tell me how well you have done.**

In similar fashion, assign all the children to helpers, get their reports, and enter the results in the inventory chart.

To be sure that the data as recorded are dependable, assign each child to another helper for an independent report at once or perhaps the next day.

You will recognize the need for certain cautions:

Make clear to your helpers what they are to do and what they are not to do. For example, they are not to supply numeral names to children in their group if they hesitate. They are, however, to report accurately both the limits reached by each child in his counting and the points (if any) of his difficulty.

Listen to each helper as he "tests" at least one child, substituting other helpers for those who are careless or fail to follow directions.

You yourself test each child who refuses to count for a helper or for whom differing results are reported. Test also each child reported as deficient in counting, and record his special learning needs.

Identification of Groups to 15

Put six books on your desk and ask the class, **Who can tell me how many books I have?** Let a volunteer (say, John) try to identify the group. Whether his answer, announced to the class, is correct or incorrect, ask, **Who wants to see whether John's answer is right?**

Repeat with two or three other children.

When the children show that they understand what is to be done, put four more books on the six, and proceed as before.

Next make up small groups of four to six children and have each group assemble around its own table. Put on each table 15 buttons (or other small objects). Select one child in each group to identify the number and report to you in a whisper.

Then quietly inform the members of each group of the answer given by the first child and let others take turns identifying the number of items. Take note of those who furnish correct answers.

Now put five more buttons with the first 15, and mix them thoroughly. (You are looking for helpers; so, you go beyond the limit of 15.) Have some child in each group who was successful with 15 try the larger number, reporting to you in a whisper. Continue then as before, giving each child a chance to identify the 20.

Select six children who have been able to identify 20 buttons, and test them yourself with 25 buttons, one child at a time, and each by himself. Choose the most capable children as your helpers, and let them test groups of children for you. Observe the cautions mentioned above in connection with counting, and enter in the inventory chart only records which have been verified by a second trial with 15 objects under the direction of a different helper. You yourself will need to test children of the types referred to in the section on counting by rote.

Reproduction of Groups to 15

Again the testing is to be preceded by class experiences and then is to be done by helpers for the most part.

Say: **Joan, we need six pairs of scissors (or whatever) for your table. Will you get them from this box? . . . And, Ruth, will you take six pairs of scissors for your table?** After Joan and Ruth have done as requested, have other children (by identification) determine whether Joan and Ruth have counted out the right number.

Continue: **Joe, will you pick ten children to come to this chalkboard.** Have the class check. **Mary, will you count out fifteen black crayons so that everyone here will have one?**

Use as helpers some of the children who tested identification of groups to 15. (Identification and reproduction are not the same process, but they are closely related.) Make sure of their competence by testing each individually. Have each one furnish you 18 objects, then 26 objects, from a larger supply you have at hand.

Next, give each helper about 20 objects, and have him test the three to five children in his group by asking each separately to supply 8, then 10, then 15 objects. Have helpers report immediately to you after testing each child, and check as may be necessary so that your entries in the inventory chart are accurate and dependable.

Understanding and Recognition of Regular Groups to 3

Begin again with the class as a whole. Your pupils may need little practice in recognizing a group of 2 or 3 real objects but the

recognition of patterned groups may be a little more difficult. Use cards of the kind for patterned arrangements of representative items described on *Teachers' Edition* page 13 to acquaint your pupils with the nature of the ability you are testing and with the kind of expected response. Include with the cards for 2 and 3 also cards for 4 and 5 and arrange them in random order. Expose each card only an instant, keeping the time too short for counting. After showing a card, put it back with the others so that you can show it again. Thus, the order of presentation for the patterns might be: 2, 4, 5, 2, 5, 3, 4, 2, 5, 3, 2, 4, 3, 2, 5, 3, 4, 5, 2, 4. Each card might be exposed at least four times.

Say: **Let's find out how quickly you can see how many dots there are on each of these cards. You will have to watch closely because you won't see the cards very long. When you think you know how many dots are on a card, raise your hand, but don't say anything until I call on you.**

Show for an instant the card with the pattern for 2. Ask three or four children who have raised their hands to tell how many dots they saw. Do not indicate whether their estimates are correct; but at the end of the volunteered answers, say: **How many of you think you saw two dots on the card?** Next, show the card again as long as may be necessary for every child to make sure that there are two dots.

Next say: **Now, I am going to show you more cards. Watch carefully!** Show the card with the standard pattern for 3, and ask a few children to tell how many dots they saw. Do not inform them of the correct number of dots shown. Continue with the practice in the same way.

In the course of this pre-testing, identify the few children who seem to be most capable. Test them with small cards for individual work (which your more capable children can make) modeled after those used for class presentation and select the ablest pupils for your helpers.

Furnish each helper with a set of individual cards for the patterns for 2 and 3 only, but with at least three cards for each pattern. Explain clearly the method of presentation (short exposure, random order), and assign three to five children to each helper. Have the helpers report immediately to you after testing each child, and supplement the helper-testing yourself by checking in the manner described in the section on counting by rote.

There is no reason at all to be disturbed if your pupils are not very successful in recognizing regular groups of 2 and 3—or for that matter, if the testing itself does not go very well. You will have plenty of time in which to teach these group patterns, and the experience your pupils will have had in the testing will do much to get them ready for your instruction.

Ordinals through third

In testing ability to use the ordinals intelligently, you will deal both with identification and with reproduction.

Identification: **In which place is Sue sitting?** (Answer to be *first* or *second* or *third*.)

Reproduction: **Go stand in the first (or third or second) place.**

Line up three children in front of the class. Say: **Tell me where Joe is standing, first, second, or third in the line. Where is Frank standing?** In each case, have some child answer the question, and have the class check.

Then say: **Tom, go stand in first place. Frank, go stand in third place (and so on, checking in each case).**

From the entries already in your inventory chart, select for helpers five or six children who have made the best records. Test each individually with a picture, showing a row of ten birds on a telephone wire. Go beyond the limit set for the period and include the words *fourth*, and *fifth*, so as to be sure that your helpers have the ability in question in excess of what is needed.

Supply each helper with a similar picture; give directions for testing the ordinals only through *third* and have each helper work with assigned children and report to you. Check as needed.

It is unlikely that you will get reliable results on the use of ordinals from all members of your class; but you should be able

to get accurate data about those who unmistakably have the requisite knowledge. Likewise, you will be able to get a general impression of the status of your group as a whole, and the experience they have in the checking will make instruction on ordinals easier later on.

Readiness Lessons for the Primer

1. Teaching Common Comparison Words and Quantitative Terms

Background

Instruction on this objective, scheduled to begin at once with reference to the list of words on *Teachers' Edition* page 33, is of course not completed in the first period—or in the first year, for that matter. There are just too many of these terms to learn in a few weeks. For this reason the objective is listed again with a suitable list of words and terms suggested, for each of the subsequent periods of instruction of the first half year.

Moreover, instruction of this objective is an exception to the general comment made earlier, to the effect that in the first period of instruction you had best work with small groups of children rather than with the class as a whole. (Other exceptions are instruction on *Objectives 5, 6, and 7.*) The reason is that the comparison and quantitative terms to which you will direct attention are those which, for the most part, are used by the children themselves as they talk about activities involving quantity or quantitative relations.

Teaching Suggestions

For example, some child says, "We will need a lot of crayons for our table," when actually only three or four are required. If some child does not object to the inaccurate use of the term "a lot," once the needed number has been supplied, put the objects in a group and ask, **Do you think this is a lot of crayons?** Rely as far as possible upon the comments and criticisms of the children for correction of the error. Otherwise, furnish a group of ten or fifteen crayons and point out that "a lot" is more appropriate for this number than for three or four. From then on, watch use of the term to make sure that it is properly used; and you yourself employ the term—sometimes even incorrectly, to see if your pupils will note the error.

Or, another child may report that it takes him "a long time" to come to school. Ask him to be more definite. If he can state the number of minutes or tell by reference to the clock when he leaves home and when he arrives at school, discuss his use of "a long time" with the class. Have other children report how long it takes them to get to school and, by comparison, help them to decide whether the first child has reported "a long time" correctly. Obviously, in this connection other quantitative terms such as *larger*, *short*, and *shorter* may appear in the conversation.

Still again, a child says that he has "as many" of something as another child has. Have the two children match objects, pair by pair, to see if he does have "as many." Or, better yet, ask the class to tell how they can find out (for example, enumerating objects in each group and comparing totals, or matching as above), and try out the procedures suggested. Take time to develop the exact meaning of the term; check on subsequent use by your pupils, and use the term yourself frequently.

One last example: Suppose that a child asks for a "bigger" sheet of ruled paper than the one he has, whereas actually he needs a longer sheet. Deliberately give him a "bigger" sheet, but one that, while wider, is not long enough. Make use of the

incident with him and with the class to teach the meanings of *longer*, *wider*, and *bigger*, pointing out that you did give the child a "bigger" sheet of paper, as he requested, but that he should have asked for a "longer" sheet of the same kind as he had.

Here as well as elsewhere, tell the children nothing that they can supply themselves. You cannot give children ideas; children themselves must develop them. Children's experiences in self-expression, as they point out and explain errors in the use of quantitative terms by others and as they justify the terms they employ (accurately or inaccurately) are about the best of all means for acquiring precision. Moreover, their comments may convey more meaning to their fellow pupils than can your own. After all, pupils are closer to the learning than you are.

2. Teaching Rote Counting to 15

Background

There is no logic in the names for the numbers 1 to 12. No amount of reasoning can enable the child to discover that *two* is the correct name for a group of two objects. Except for historical reasons unknown to the child at the time of learning (if ever), the word might just as well have been "bolen" or "chulik" or "lipecx." Each of our number words to *twelve* is a purely conventional symbol, in and of itself carrying no meaning. (Note that we speak here only of the words, not of the ideas for which they stand. Number ideas are a different matter: they must possess meaning if they are to be useful, but the development of number meanings is more the concern of later objectives.)

Likewise, there is no rhyme or reason about the order of the number words in the series to *twelve*. Why, for example, must *seven* (save for meanings again) follow *six* and precede *eight*?

Beginning with *eleven*, our ancestors had a chance to introduce sense into the number series from that point on, because every number from *eleven* to *nineteen* contains a ten and some extra ones. We see this fact in the words *thirteen* (three-ten), *fourteen* (four-ten), and so on. But not so for *eleven* and *twelve* where, lacking the syllable *-teen*, there is nothing to indicate the presence of a ten. Actually, our word *eleven* is derived from the Gothic *ainlif*, which meant "one-ten," and *twelve* from *twalif* which meant "two-ten." But little is gained from trying to put this amount of meaning into our words *eleven* and *twelve* since there is so little resemblance to the earlier forms.

From *twenty* on, we can make maximum use of the repetition in our number plan to put sense into counting. *Twenty* is two tens; *thirty* is three tens, and so on. The words for naming the even decades, of course, have been shortened, but the *-ty* can be seen to be "ten," and the *twen-*, *thir-*, and *for-* are recognizable as altered forms of *two*, *three*, and *four*. Moreover, of course, within the decade we repeat the basic numerals, *one* to *nine*,—as in *twenty-one*, *twenty-two*, and so on.

Teaching Suggestions

From what has been said, it is clear that children can master the series to *twelve* only by memorization, and the teaching method is that of administering repetitive practice. Divide your pupils according to the data on your inventory chart, making

three groups: (1) those who know the series to fifteen, (2) those who *almost* know the series, and (3) those who have much to learn. Turn over the children in group (2) to those in group (1) for help with their practice. You yourself take charge of those in group (3). Concentrate first on the series to *five* or to *ten*, as may seem preferable. Pronounce the number words clearly and distinctly, and have the children respond with equal precision. Keep on until all know the words in proper sequence.

It is doubtful that commonly used "poems" are of much real value. We refer here to such rhymes as, "One little, two little, three little Indians," and so on, and "One, two, buckle my shoe," and so on. Of course there is an attractiveness about the rhythm; but, after all, to be able to count, the children, having once learned the doggerel, must disentangle the number words from their context, and this feat may be as difficult as learning the word series itself.

Next, lengthen the series only through *twelve*. The words *eleven* and *twelve* are hard to pronounce accurately and it is well to have them mastered before moving on.

The next part of the series is *thirteen*, *fourteen*, and *fifteen*. With these words stress the *-teen* in pronunciation, and explain that it really means "ten"; hence, *thirteen* means "three and ten," *fourteen* means "four and ten," and so on. Stress also the similarity or identity of the first part of the words to the basic numbers—*thir-* to *three*, *four-* to *four*, and so on.

Rote counting can be put to work in an interesting way in games where a child who is "It" must keep his eyes covered while he counts to *ten* or to some other designated point. Note that while such uses put no meaning into the numbers or the number series, they do afford enjoyable practice.

3. Teaching Oral Identification of Groups to 15 (Enumeration)

Background

The following statements have already been made at some point in the *Teachers' Edition* or they are self-evident. Nevertheless, it is well to assemble them here:

Identification answers the question, "How many?"

The answer tells how many *ones*.

The answer in identification is a cardinal numeral (for example, *five*) and *not* an ordinal (*fifth*).

Identification starts the long process of developing meanings for the numbers and contributes to the serial idea of the numbers.

The ability to identify the sizes of groups is of large practical value (not alone to children) and is correspondingly appreciated when learned.

Identification puts to work skill in counting and affords further well motivated practice on it.

Teaching Suggestions



It is well at the outset to make clear to the class as a whole, without using the terms, the distinction between cardinal and ordinal numbers. Many children who can correctly say, "One, two, . . . five" as they touch successively the fingers on your hand are unable, when finished, to answer the question, **How many fingers have I on my hand?** The reason is that for them the "five" they have said refers actually, not to the group as a whole, but to the last finger touched, and **How many fingers?** does not seem to be an appropriate question.

To make this distinction, by all means use a natural classroom need for identification if one arises. Otherwise, arrange a situa-

tion like that which follows, and which in any case can be used to illustrate the procedure:

Point to a group of movable objects, such as a row of six crayons on your desk, and ask, **How many crayons are there here?** Let a volunteer come forward. Watch what he does while he enumerates. Ask, **How many in all?** Then ask, **Where are the six crayons?** If he cannot answer or if he points to the sixth crayon, he lacks the understanding to be developed. If he sweeps his hand over all six or pulls the six together or in any other way indicates the total, he probably has this understanding.

Regardless of what happens, demonstrate identification to the class. Hold up a hand with the fingers widely separated. Point to the thumb, saying **one**. Then as you say **two**, move the index finger alongside the thumb to show the *group* of two. When you say **three**, join the middle finger with the group of two, to make a group of three. Continue in the same way with the fourth and fifth fingers. The movement of the fingers to build the increasing group puts the emphasis where we want it, namely, on the group.

Organize several similar situations involving groups of four to seven objects, but use only movable objects. Have different children demonstrate identification to the class, insisting that each object after the first be made to join the growing group and ending always with the question, **How many are there in all?** Continually emphasize that the last number word used refers to the total in the group, and not to the last object enumerated.

You are now ready for small-group instruction. Again make use of your inventory data. Let those pupils who can correctly identify groups much larger than 15 work with others who need only a little assistance. Supply each helper with 20 or more small movable objects, and have him require identification by the method demonstrated before the class. You yourself take charge of children who are more seriously deficient in the skill.

We hope we have made clear the value of using movable objects, real or representative, in the earliest stages of teaching identification: by moving the objects to make the enlarging total, your pupils can see the result as a group. But we do not always, of course, actually manipulate objects in identification. For example, we identify the number of sounds we hear or the number of objects in some more or less fixed relationship, as in a wall frieze.

As for sounds, tap a bell or clap your hands or bounce a ball several times and ask your pupils (who have covered their eyes) to tell how many sounds they have heard; or you may have a child produce the sounds. This work with sounds may prove to be difficult, but pupils should reach the point of recognizing that sounds can be counted just as visual objects moved together can be counted.

As for stationary items that are seen, which should come later than the activities heretofore described, you may frame some part of your class *Counting Chart* (see *Teachers' Edition* page 11) exposing, say, a row of ten balls and a few more and ask the children to identify the number; or you may point to a pile of books and ask for the total number of them.

It goes without saying that you will encourage your pupils to utilize as fully as possible their increasing skill in identification in connection with their classroom activities and their personal problems. Remember the social aim of arithmetic, even in the first grade!

Games for Practice in Identification

The following two games may be of use in practice of an enjoyable kind and they may suggest others:

Basketball. Set a large wastebasket or box in an open space and draw a base line on the floor six or seven feet away. Have the children

*When you see this symbol, watch for opportunities in the lesson to use the Ginn *Arithme-Stick* described on *Teachers' Edition* page 9.

take turns drawing into the basket. Each child has five or ten throws with beanbags (or softballs). He then counts the number of bags in the basket for his score. Or he may count the number on the floor as he picks them up for the next child, in which case the score is better if it is small.

Tenpins. Draw crosses on the floor in the design for setting up tenpins. Place paper cylinders (for example, certain empty cereal boxes) over these crosses. Each child rolls a softball to knock down as many cylinders as he can. His score is recorded after he counts the number of cylinders he knocks down.

4. Teaching Oral Reproduction of Groups to 15 (Enumeration)

Background

Remember:

Reproduction consists in supplying an indicated number of objects in response to the direction, "Give me five pencils."

The numeral in the direction is a cardinal numeral—as *five*, not *fifth*.

The objects supplied are usually thought of as a collection of ones, or separate objects.

Through reproducing groups, number meanings are advanced.

Reproduction, like identification, puts the ability to count to a useful purpose, and thus supplies well motivated practice.

Teaching Suggestions



The statements above closely resemble the similar statements made earlier for identification, the difference being in the nature of the activity. And so, by modifications, the teaching suggestions for identification can be altered to fit the new purpose.

The following description illustrates a possible lesson:

We are going to play a game. Use the things in your box. (Reference here is to the representative objects. See *Teachers' Edition* page 6.) **Are you ready?**

Lay 3 buttons in a row on your table (or desk).

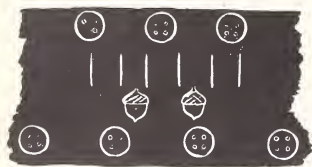
Lay 6 sticks in a row just under the buttons.

Now put 2 acorns in a row under the sticks.

Put 4 buttons in a row under the acorns.

Make your table neat, so that I can see whether you have played the game well. When I have looked at all the tables (or desks), I shall draw pictures on the board. Then you can see if your answer is right.

Inspect the work, having the more capable children help you, and then make the drawing on the board. It will look something like this:



Seatwork

In the case of identification, seatwork is very difficult to organize, since the results are almost necessarily numerals which the children at this time cannot read or write. This is not true, however, in the case of reproduction where the numerals involved can be given orally by the teacher. Try out some of the following suggestions:

Mimeograph rows of gingerbread men, with specified numbers of buttons to be drawn; or rows of ducks, with hats to be drawn for a stated number; or a row of blank boxes in which dots are to be drawn to reproduce given numbers.

Mimeograph pictures of single objects—a house, a fence, a tree branch. Say: **Draw 4 windows like this** (show a box on the chalkboard) **for the house. Put 8 birds like this** (show a large bird) **on the fence. Draw 6 leaves like this** (demonstrate) **on the branch.** Allow plenty of space because, as you know, your pupils have trouble drawing small objects.

Games for Practice in Reproduction

Below are games which afford enjoyable practice:

Pony. One child is ringmaster. The other children are ponies, each with a numeral for a name. They form a circle around the ringmaster. He calls for a group of 4 (or some other number) ponies. The ponies numbered 1, 2, 3, and 4 step forward. If the correct number is given, the ponies trot around the ring and return to their places. If a mistake is made in reproducing the group, pupils must go at once back to their places.

May I? The leader stands behind a line drawn on the floor or ground, and the other players behind another line facing the leader some twenty-five or thirty feet away. The leader tells each child in turn how many steps he may take toward the leader's line and what kind of steps: **John, you may take five baby steps. Jane, you may take two giant steps. Tommy, you may take four duck steps.** Each child in his turn must say, "May I?" before he takes any steps or he must go back to the base and start over. If he takes the wrong number or the wrong kind of steps, he draws the same penalty. The player who reaches the leader's line first becomes the new leader.

5. Teaching Some Understanding of the Numbers to 3 through Comparison of the Sizes of Groups and Immediate Recognition of Groups of Real Objects and of Patterned Groups

Background

The child who can think of *three* only as *one* and *one* more and *one* more—an aggregate of ones—is dependent on enumeration by ones. Now, this serial idea of numbers is highly important; indeed probably both in the individual and in the race. It is basic to the more mature ideas of numbers and we extend the serial idea by providing activities involving the reproduction of groups. In this connection the child is helped in his understanding of the group of 3 as one more than the group of 2 and of the group of 2 as one less than the group of 3.

But the serial idea of numbers is pretty limited. It does not equip children adequately for the arithmetical tasks which they will later encounter. Thus, the child who has only the serial idea for 2 and 3 can deal with 2 + 3 only as 1 + 1 + 1 + 1 + 1. And this is precisely what he does: he counts. Conversely, the child who is found to count number combinations may confidently be diagnosed as not having advanced further than the level of serial-number ideas.

Beyond the serial idea of numbers is the group idea. "Three" is not merely a collection of ones; it has an integrity, a unity of its own, and we can think of the number meaningfully without reducing it to its constituent ones. In the first period of instruction we believe it advisable to start understanding of the numbers to 3 as totals of groups, in the sense just described. We say "start" because as experience is gained, understandings broaden, deepen, and become more precise. We begin by teaching children to recognize at a glance first groups of 2 or 3 real objects and then regularly structured patterns for these numbers. Being able to see \cdot at once as *two*, without counting, is an initial stage in thinking of *two* as a group.

Many patterns for 2 and 3 are possible. For 3, for example, we could use $\cdot \cdot \cdot$ or $\cdot \cdot \cdot$ or $\cdot \cdot \cdot$ or $\cdot \cdot \cdot$ or $\cdot \cdot \cdot$ and there probably would not be a great deal more to favor one over another. But the more objects in the pattern, the more important it is that regularly structured patterns be adopted. While a pair of dots in almost any arrangement, provided they are not too far apart, can be recognized as 2, such is not the case with larger numbers of items. Can you tell without counting how many dots are in the box at the right?



We have rather arbitrarily decided to use $\cdot \cdot$ or $\cdot \cdot$ for 2 and $\cdot \cdot \cdot$ for 3. These patterns are readily distinguishable, one from another, and we suggest that you adopt them. Later other patterns can be introduced.

Teaching Suggestions

Place on the chalkboard-ledge large *Pattern Number Cards* for 2 and 3. Have your pupils (the whole class or only those needing special help) study the cards and tell how many each pattern stands for. Ask the pupils to verify by enumeration. Then point out the differences between patterns, in order to fix the patterns themselves firmly in mind. Also at this time ask pupils to state the difference in the sizes of the groups; that is, to tell in his own words that a group of 3 is one more than a group of 2; and that a group of 2 is one less than a group of 3.

Next, have the children close their eyes, opening them when you are ready to expose one of the cards and give the signal, **Ready**. Show the card but a second or two; then turn it over and ask, **How many?** Continue for two or three minutes, presenting the cards in random order.

Organize pairs of children for practice as needed, one of the two (the helper) being clearly competent in the skill in question. You may use smaller individual cards for this purpose.

Occasionally, perhaps for a minute or two a day, each two or three days, use the cards for class practice.

6. Teaching Intelligent Use of Ordinals through *Third*

Background

As we have said before:

Ordinals are naming numerals; that is, they locate the place of an item in a series.

Ordinals are used both for identification (**Which mark is this—first or second?**) and for reproduction (**Bring me the third book on the shelf**).

Teaching Suggestions

Examine the records in your inventory chart in order to organize your teaching. For your personal attention, select those children who are most deficient in understanding the ordinal names and their uses.

The words *first* and *second* must be memorized with no aid at all from the corresponding cardinal names, *one* and *two*. With *third* (which bears a slight resemblance to *three*), relate the ordinal word to the cardinal. At the same time, make sure that your pupils understand that ordinals refer to single objects, not groups.

Start instruction if possible with real need arising from a class situation. At the beginning, too, it may help your pupils if you use the terms *the first one*, *the second one*, and so on, instead of merely *first* and *second*. Later, the extra words may be dropped. A sample lesson follows:

Give these children ordinal names. The one at the left, John, will be "First." Mary, who is at John's right, will be "Second." Have the children at their tables name the last child if they can. You will supply the ordinal name if they do not know. Have some child give such directions as: **Second, hop on one foot. Third, bring me a book. First, raise your hand.** The children at the tables can check correctness, the first child who detects an error being allowed to give the commands or to take the place of the child who made the mistake.

Seatwork

Mimeograph rows of moons, hearts, cats, balls, and what not, on a single sheet of paper. Give such directions as: **Put X on the first moon. Draw a ring around the third moon. Color the second heart red. Color the first heart blue.** Once the entries have been made, the pages of material may then be corrected and used for oral instruction.

Games. Use the following games or others that the games may suggest:

Find the Chair. Put three chairs in a row. Tell some child to sit in the third chair, then in the first, and so on. If a child sits in the wrong chair or cannot find the right one, he loses his turn. The child who discovers the mistake then has a turn.

Interest can be varied by calling the chairs cars in a train.

Spin the Pan. Choose a group of three children. One child spins a large pan or disk and calls another child by his place in the line, as "Third." The one who is third must catch the pan before it stops spinning. If he does, he spins next. If he does not, the same child spins again and calls out another child in line.

7. Developing the Ability to Deal with Simple Problem Situations by Using Real and Representative Objects

Background

If one asks an adult, or even a fifth-grade child, **How many apples shall we have if I put these two with the three already in the dish?** he would be amazed for he would think "five" at once and expect you to know that he would. Ask the same question of almost any first-grader, and he would be helpless. He has a long way to go before he can think confidently and accurately about number relations like this one. It is our responsibility to help him traverse that distance. He cannot cover it in a single jump (as by memorizing " $3 + 2 = 5$ "), but instead must approach the ability gradually, by mastering a series of progressively more economical and mature procedures.

We begin with objects, having the child manipulate them according to the demands of the situation—using first, real objects (in the situation described above, actual apples and a dish), then representative materials. We concentrate at one time on the meaning of the numbers themselves (as has already been done in this period and as will be done in later periods), and at another time on the processes involved (here that of putting together two apples and three apples; or it may be that of separating a group, as in, **If I eat one of the five apples, how many apples will be left?**). Imperceptibly, so slowly do we move, the child comes to understand addition and subtraction as well as how these processes affect the numbers involved. In this way the child is introduced to problem-solving, without his knowing it and without giving the process this name.

In connection with instruction on several of the objectives already discussed, your pupils will have learned that pegs or sticks can be substituted for real objects (chairs, crayons) and that these groups of representative materials can be made to stand for the real ones.

Assume a "real" situation such as this: **We have two chairs at this table. If we put another with them, how many will there be?** Ask those who know to raise their hands, but do not call for answers. Instead, say: **Who can tell me how we can find out?** Some child will suggest that you put another chair at the table and then count them all. Do this—move the chair and make a tight group of three chairs. (You are demonstrating, or dramatizing, a *put-together* story,—the making of a total.)

Repeat with several other situations involving the idea of addition using real objects.

Suggest that perhaps you do not need to move chairs or books or what not, but can use something else. Try to elicit the suggestion that representative materials be substituted. Have the children then set up one group (for two chairs) on their tables (or desks) and put another item with it (for the extra chair), ending by noting the total. Repeat with other situations.

Using another problem, show that drawings (**H** for a chair) and marks on the blackboard can be used to get the answer.

Do not hurry the pace of instruction. Remain at the level of real objects until your pupils demonstrate their understanding and proficiency before changing to representative materials and drawings. Stay, too, with the words *putting together* and *separating*, or *taking away*.

As we have so frequently said, make as much use as possible of classroom needs for working on this objective. Below we are giving you numerous more or less artificial problems with which to supplement such situations.

Put-Together Problems

1. Jack ate 1 cookie and then he ate another. How many cookies did he eat in all?
2. Billy's mother was baking a cake. She put in 1 cup of flour and then another cup of flour. How many cups of flour did she use?
3. Hal gave the store man 1 cent for a pencil and then 1 cent for an eraser. How many cents did he give the store man for both the pencil and the eraser?
4. A dog buried a bone in the yard and then he buried 2 other bones in the yard. In all he buried how many bones in the yard?
5. Dan had 1 marble and he found 2 more. He then had how many marbles?
6. Jack put 2 nails in one end of a board and 1 more in the other end. How many nails in all did Jack put in the board?
7. Two cows went into the barn. Two others followed. How many cows went into the barn?
8. Sue has 2 oranges in a bag. If she buys 2 more, how many oranges will she have?
9. Ralph had 3 baskets of leaves. He filled 1 more basket with leaves. How many baskets full of leaves had Ralph in all?
10. One child went into the school yard to play. Then 3 more children went into the yard to play. How many children in all went into the school yard?

Take-Away Problems

1. Two ripe apples were on a branch. One fell off. That left how many apples on the branch?
2. Carl had 2 dogs. One ran away. He had how many dogs, then?
3. There were 2 bananas on the plate. I ate 1 of them. How many bananas were left?
4. Joe's mother gave him 2 cents. He spent 1 cent. Then how many cents did he have?
5. There were 3 roses on a bush. Someone picked 1 of them. Then how many roses were on the bush?
6. Dick caught 3 fish. One of them jumped back into the water. Then Dick had how many fish?
7. There were 3 words on the chalkboard. Then 2 of them were erased. How many words were left?
8. Four hens were in the yard. One got through a hole in the fence. Then there were how many hens in the yard?

9. Four bars of soap were on the shelf. One was taken for washing dishes. That left how many bars of soap on the shelf?
10. Mary had 4 paper dolls. She lost 2. Then she had how many?

Seatwork. Problems like those above can be solved by the class as a whole, by using representative materials or by making drawings. (In take-away situations, the objects withdrawn can be crossed out in drawings.) Problems can be used also as the basis for seatwork. Your pupils can work, say four problems, with representative objects, leaving answers (groups of objects) for inspection. Or, they may alter mimeographed pictures by drawing a ring around the total group (for put-together situations) or by crossing out objects (for take-away situations), leaving as the "answer" the items untouched.

8. Teaching the Disposition to Use, and the Habit of Using, Number in Practical Ways

Need we say more about this outcome, and ways of achieving it, than we have already said? It is obvious that there can be no single lesson or series of several lessons to accomplish the purpose. Habits of use grow out of experience in using—much and varied and continuous experience—not out of an isolated experience or two. It follows therefore that throughout the day you will consistently provide opportunities for your pupils to apply their number ideas and skills and will encourage your pupils to note such opportunities themselves. For example, you can suggest in the interest of greater precision that your pupils employ the ordinals in place of "that one" or "the next one" in making requests and in reporting their activities. Here as elsewhere arithmetic language takes on significance the more it is utilized in normal, natural ways.

9. Teaching to Develop Desirable Emotionalized Responses with Respect to Arithmetic

Do you recall just what we mean by "desirable emotionalized responses"? We explained the words on *Teachers' Edition* page 33, but let us repeat. We want children to respect the logic and order of arithmetic and to expect to understand it; to like arithmetic and get satisfaction from learning it; to appreciate the values of arithmetic for what it does for them; and to want to succeed in learning it. And also we talked about the importance of such attitudes and appreciations and about ways of engendering them in your pupils. At this point then, we want to add very little about this objective.

Remember that the first term of systematic instruction is not too soon to start the development of these attitudes and appreciations. Children, even so early, reveal in their behavior unmistakable evidence of liking or disliking arithmetic. You need only to be alert to this evidence. Remember too, what we said before and what can be stated here in the old proverb, "Nothing succeeds like success." Unfavorable reactions toward arithmetic come from frustration and failure. They can be forestalled by insuring success; and if, despite attempts to prevent them, they still arise, the remedy is the same: success.

Test of Attainment of First-Period Objectives

For the second, third, and fourth periods of instruction, test pages are provided in the *Primer*, at the ends of the units for these periods. The *Primer* provides tests, too, for the first period. The activities called for on *Primer* pages 1, 2, and 3 actually are inventory tests (to be used for selected written experiences in addition to the oral testing given at the end of the first period of

instruction) to discover more exactly the results of your pre-Primer teaching. All this will be explained under Discussion of the Second Period of Instruction, which follows.

Before proceeding to the second period of instruction, however, it is important to take stock of the extent to which your children have achieved the objectives for the first period of instruction.

To facilitate this check up, we have prepared an oral test which you may wish to use with some or all of the children in your class. In some instances you will know from past observation whether a given child has attained each of the instructional objectives for the first period. In other instances, you will find it helpful to administer part or all of the test that follows to various children in an attempt to assess their present status.

In any event, after you have determined the extent to which each child has attained the first-period objectives, you will need to do whatever reteaching is necessary before proceeding to the work of the second period of instruction.

The preparation of a chart such as the one below will help you in recording the attainment of objectives for each child and will also guide you in any reteaching that may be necessary.

1. Write "OK" in column 1 if the child has developed the ability to use comparative terms such as the following in a correct way consistently: larger(est), smaller(est), more, less, taller(est), shorter(est), bigger(est), higher(est), and so on. If correct use of such terms has not been observed consistently, place a question mark (?) in this column. Otherwise place a zero (0).

2. (A) Show 9 cubes in jumbled arrangement. Ask, **How many?** Write "OK" in the "9" column if identified correctly; otherwise, write "0." Do the same with 15 cubes and 12 cubes. If 9, 15, and 12 are identified correctly, you may want to skip item B.

If both 9 and 15 are identified incorrectly, go immediately to item B.

(B) Show 10 blocks in a straight line. Ask, **How many?** Record as before.

Do the same with 14 blocks and 7 blocks in a straight line. If all are identified correctly, go on to item C.

(C) Have 20 cubes available in front of the child. Instruct him to **Put 11 blocks here** (on a sheet of white paper). Record "OK" or "0."

Gather all 20 cubes together and again give instructions for 13 blocks and then for 8 blocks. If all groups are reproduced correctly, the pupil is ready to go on to section 3.

(D) If persistent difficulty is encountered with identification and/or reproduction, ask the child to count (by rote) as far as he can. Record how far he counted.

3. Show the pupil a group of 3 buttons and a group of 2 buttons. See if he can tell which group is bigger; which is smaller; that the 3-group is one more than the 2-group; that the 2-group is one less than the 3-group. Then, on pre-marked pattern cards, arrange buttons in groups as shown in item 3—one group at a time. (Put up a shield while arranging buttons so the child cannot see them.) Tell the pupil you are going to show him some buttons *quickly* and he is to tell you how many he sees. Expose each group, in turn, *very briefly*. Record the results on your chart.

4. Put more than 3 blocks in a line. Ask the child to give you the third block from the left. Record "OK" or "0."

Do the same with several blocks, asking for the first one. Record the results.

Do the same with several blocks, asking for the second one. Record the results.

5. Place 8 blocks in front of the child and tell him that he may use as many of them as he may need to help him answer each of these questions:

You had 2 blocks and someone gave you 2 more blocks. Then how many blocks did you have in all? Repeat if necessary.

You had 5 blocks and you gave someone 2 blocks. How many blocks did you have left? Repeat if necessary.

You had 3 blocks and Sam brought you 2 more blocks. How many blocks did you have then?

Jack had 4 blocks. He gave you 1 block. Then how many blocks did he have?

Record which problem(s) the child solved correctly by writing in column 5 "AS" for both addition and subtraction; "A" for addition only; "S" for subtraction only; and "0" for neither.

6. Write "OK" in column 6 if the child has shown evidence of using number and number ideas frequently on his own initiative in connection with practical situations within the classroom and without. Otherwise, write "0."

7. Write "OK" in column 7 if the child has shown evidence of an interest in and positive attitude toward number and number ideas; if he appears to sense value in knowledge of number and its application.

Name	1.	2.									D	3.						4.			5.	6.	7.	
		Identification						Reproduction				Group Understanding and Recognition	Ordinals											
		A			B			C																
		Jumbled			Linear																			
		9	15	12	10	14	7	11	13	8						Counting to:	••	•	••	•				••
Billy C.																								
Jane F.																								
etc.																								

Discussion of the Second Period of Instruction

Introducing the Primer

Now that your pupils are ready for the *Primer*, we can be of more systematic help to you. The reason is that henceforward you will be able to organize a large part of your teaching around *Primer* pages. But note the words "a large part." We do not imply that the *Primer* and the daily lessons you prepare based upon *Primer* pages can be expected to carry the full load of instruction. In the first place, some of the objectives for the period (for example, counting by rote to 30) must be taken care of independently of the *Primer* and some oral Looking-Ahead activities must be injected to lay foundations for written experiences to come later in the program. In the second place, as we have said before, arithmetic even in Grade 1 is not a "school subject" to be taught for twenty minutes one day and then to be laid aside until the next day. On the contrary, arithmetic as children see it should be so vital that it will contribute (as does language itself, of which it is really a part) to all sorts of activities throughout the school day. And it is your responsibility to see that arithmetic does perform this function.

You will want to use written experiences now in inventorying your pupils on the results of the oral experiences with manipulative materials which you have been administering in connection with the objectives of the first period of instruction. For this purpose, pages 1-3 of the *Primer* have been provided. Then you will start work on the objectives proposed for the second period of instruction, using the subsequent *Primer* pages. These objectives we are listing and discussing below. Then we shall suggest lesson plans (Remember: They are purely suggestive!) for the successive *Primer* pages 4 to 26. Page 26 provides a test for the unit as a whole.

Arithmetic Objectives for the Second Period of Systematic Instruction

- (1) Increase in ability to use understandingly words for comparison of sizes and many common quantitative terms other than numerals*
- (2) Ability to read the numerals to 6 (and the number words to three) and to understand the place of each numeral in the series
- (3) Ability to count by rote to 30 and the ability to enumerate (for both identification and reproduction)
 - (a) orally with concrete materials to 30*
 - (b) in association with written numerals to 6
- (4) Extended understanding of the numbers to 6 through comparison of the sizes of groups and immediate recognition of patterned groups
- (5) Ability to use ordinals orally through fifth*
- (6) Ability to write the figures 1, 2, and 3
- (7) Understanding of the coins cent, nickel, and dime through oral experiences and the symbol ¢ in written experiences with the cent and the nickel
- (8) Ability to deal with simple problem situations by using real and representative objects*
- (9) The disposition to use, and the habit of using, number in practical ways*
- (10) The possession of desirable emotionalized responses with respect to arithmetic—attitudes, appreciations, and values*

*These objectives are developed orally only, because either the *Primer* pages do not lend themselves to the learning in question or the material serves as readiness for written experiences to come later in the program.

Discussion of Objectives

As the list of the objectives indicates, the instructional load during the second period of instruction is not particularly heavy. While your pupils will acquire a few new ideas and skills, for the most part they will extend in written experiences ideas and skills already acquired in some measure through oral experiences with manipulative materials. They will learn to use the *Primer* exercises and through them to study the ideas and relationships.

Objective 1. You will recall our statement that no one learns at one jump, as it were, all the many comparison and quantitative terms, other than numbers, that we employ in our daily lives. Neither does one learn at one jump all there is to be known about any of them. On this account—because you will want to teach new quantitative terms in this period as well as to work for greater exactness on those you have already introduced—we repeat the objective and list here the terms to stress.

Oral Vocabulary List for Second Instructional Period

Daggers indicate words that definitely will be needed in the following period of instruction.

†afternoon	inside	†o'clock
another		outside
†bigger	†larger	right
†biggest	†largest	
	left	
†calendar	†littler	several
†clock	†littlest	†smaller
	flower	†smallest
	†flowest	
†day		†time
†dime	†middle	†today
	†midnight	†tomorrow
†fewer	†month	
†fewest	†morning	week
†hand	†night	†year
†higher	†noon	†yesterday
†highest	numeral	
†hour		

As you will see, we shall be able to give you considerable assistance toward achieving this objective, in connection with the *Primer* lessons. For example, in studying one-to-one correspondence by matching objects in groups (*Primer* pages 4 and 5) and in studying the sizes of groups (as on *Primer* pages 7, 12, 13, 14, and so on) you will have occasion to use the terms "as many as," "too many," "enough," "not enough," "more than," and possibly "less than" and "fewer than" if your pupils can understand these last terms. Then, too, with the abstract numerals which stand for the groups 1, 2, 3, 4, and 5, the pupils can learn eventually to compare, as "3 stands for 1 more than 2," and so on.

Objective 2. Work on this objective begins with written experiences on *Primer* page 6. On the highly probable assumption that most of your pupils already can read some of the smaller numerals, we teach 1 to 3 on *Primer* page 6, and 4 and 5 on page 8, immediately using those numerals in a variety of ways in the next several pages. The figure 6 is taught on *Primer* page 22, again with varying practice in the next several pages. The number words to be read in this period are *one*, *two*, and *three*, and are presented at the time the children learn to write the figures 1, 2, and 3 on *Primer* pages 18 and 19.

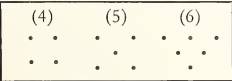
Your pupils should know, not merely the order of the successive numerals to use in enumeration or in reading some segment of successive symbols, but also the place of each of the numerals in the series. That is, he should know that 4 follows 3, precedes 5, and comes between 3 and 5. The exercises on *Primer* pages 6, 8, 10, 20, and 21 are designed to teach the beginnings of this knowledge of the numerals for the series through 5; and those in connection with *Primer* pages 22 and 24 and in the upper part of *Primer* page 26, for the series through 6.

Objective 3 extends to 30 the ability to count by 1's (rote counting). As stated earlier, instruction on this objective will have to be taken care of apart from the *Primer* lessons. At times, in connection with the Differentiations and Extensions for *Primer* pages, we shall remind you of the objective, to make sure that it is not neglected. You probably can rely upon your pupil helpers to teach most pupils who cannot count to 30. To the extent that you undertake the teaching, stress the *-ty* syllable in the names for the second and third decades (two-*ty* and three-*ty*) as meaning "ten." Provide practice in repeating the names for the even decades (counting by 10's): *twenty, thirty*. As we have explained before, once we have reached *twenty*, we can put more sense into counting. Occasionally, check on counting and make use of the skill as you can in playing games. See the section on this objective in the first period, pages 36–37 of the *Teachers' Edition*.

For identification and reproduction in this period your pupils apply the skill by enumerating orally as many as 30 objects and with written experiences as many as 6 items, thus extending the objective of the first period which was to enumerate orally as many as 15 objects. The oral experiences in enumeration for identification and reproduction your pupils will perform also with no help from the *Primer* pages, because it would obviously be a waste of space to provide pages for this activity and, anyhow, the most profitable occasions for enumeration are those which arise—or may be made to arise—during the school day. Here again you can use pupil helpers to good advantage, devoting your own time to pupils who find the skill more difficult. Now and then, with the class as a whole, frame some part of the *Counting Chart* (for example, two rows of ten balls, plus six balls in the third row) with the question **How many balls do you see?** Or, require some activity for the reproduction of up to 30 items. Use games, too, to enliven practice.

On pages 6 and 7 of the *Primer*, the pupils start written experiences in identifying and reproducing groups through 3 and during the period we extend written experiences in identification and reproduction of groups to 6. Once your pupils can read the numerals, new kinds of practice are possible, though the groups to be identified and reproduced are necessarily small in order to stay within the range of the numerals taught. The reproduction activities in the *Primer* fall into several categories. The pupil may be asked to reproduce a group of a specified size in an empty space (*Primer* page 11, top) or starting with a group which is too small (*Primer* page 11, bottom) or from a group which is too large (*Primer* page 13) or when two groups are given, the left one in a known pattern arrangement (*Primer* page 15).

Objective 4 provides for the comparison of the sizes of groups of 4, 5, and 6 objects and the teaching of the patterned groups. The patterns selected are those at the right. Remember the purpose of teaching these patterns: We employ them as means of encouraging pupils to think of 6, for example, not merely as so many ones, but as a unified concept in itself. You will note that the new patterns, as well as those already taught for 2 and 3, appear in *Primer* exercises.



Objective 5. In the first period you taught oral use of the ordinals through *third*. In this second period of instruction you will review this knowledge (as indeed you will do several times before this) and maintain it. You will also in this period extend the oral experiences with ordinals through *fifth*, in readiness for written experiences which the pupils will encounter in the next period of instruction.

Objective 6. We have postponed the writing of figures until the second period of instruction, in order to allow time for children to acquire some degree of skill in using crayon or pencil. On *Primer* page 18 we ask your pupils to learn to write the figures 1 and 2 and on page 19, the figure 3. Obviously they will have little trouble with the figure 1, but the figure 2 is another matter. Many handwriting experts take the position that the first figures to teach are the straight-line figures: 1, 6, 7, and 9. Despite the validity of their arguments, which are based upon the relative ease of writing these figures, as compared with the figures 2 and 3, we believe it best to teach 2 and 3 along with 1 at this time. Our reason is that the skill can be put to work promptly in useful ways. If the first attempts to form the figures 2 and 3 are not too good, no harm is done and, with increasing practice, the writing will improve. Substantial help is given for teaching the writing of each figure.

Objective 7. Money, particularly the coins cent, nickel, and dime, is known and has been used to some extent by practically all school beginners. Early oral experiences should determine whether there is any lack of this knowledge among your group. In connection with this objective, we make sure (*Primer* pages 16 and 17) of this understanding for the cent and the nickel, at the same time that we teach the symbol ¢, and provide practice in a new way with written experiences

Objectives 8, 9, and 10, which appeared as goals of teaching in the first period, are repeated here and will be repeated for the third and fourth periods of instruction as well. We—and you—will present frequently many problem situations to be performed with real objects and representative materials, to provide meaning prior to activities in the *Primer* lessons. (See *Teachers' Edition* page 40 for suggestions.) We—and you—will try to encourage habits of using number ideas and skills (though most of the burden must necessarily fall upon you). And you (since here we can do practically nothing) will see to it that your pupils develop desirable attitudes, appreciations, and values respecting arithmetic.

Teaching the Pages of the *Primer*

Take plenty of time, perhaps a full period, to allow your pupils to leaf through the *Primer* when it is put into their hands for the first time. Let them point out features that interest them.

Our teaching suggestions are organized under these captions for a *Primer* page: **Pupil's Objective(s)**, **New Words**, **Background**, **Teacher's Preparation**, **Pre-book Lesson**, **Book Lesson**, **Differentiations and Extensions**, and, in connection with certain pages, **Looking Ahead and Reminder**.

The first items regularly are **Pupil's Objective(s)**, a statement of the purpose of the lesson in terms of objectives the children are to attain, and the **New Words** (not more than two) on the page.

Often then, there is a section entitled **Background**. Here suggestions are made for relating the new idea or skill (a) to something that has gone before and so, for example, assures readiness for the new learning; or (b) to something which will come later in the program; or (c) to both. Further, this section

frequently enables the authors to point up more clearly the purpose they had in mind for the lesson.

The **Teacher's Preparation** suggests materials which you may wish to prepare and assemble before beginning the class work, such things as the *Number Chart* or the *Counting Chart* or representative objects or *Number Cards* that should be at hand when you start the lesson.

The **Pre-book Lesson** suggests the activities you will want to organize before presenting the *Primer* page in question. In pre-book work your pupils will use, for example, real objects or representative objects or both to help them discover the ideas that will be re-enforced a little later in connection with the picture in the *Primer*. The situations and materials we suggest for these preliminary experiences may be considered as only illustrative. You will often substitute other experiences that are more suited to your class situation.

Next comes the **Book Lesson**, the section where we suggest how to teach the lesson—or better, *one way* to teach it. If you hit upon a superior procedure, by all means use it. In these sections you will find (always in heavy type) questions suggested for your use in developing the work of the page.

The section **Differentiations and Extensions**, which appears after the Book Lesson is intended to provide activities for the *more capable pupils* or for the *slower learners* and many times for *all children*. This last is important, for all pupils should have extended experiences as a total group.

The word **Reminder** is inserted now and then. It suggests oral experiences intended to maintain an objective.

Looking-Ahead oral activities every so often are planned for and suggested at spaced intervals in order to prepare your pupils for written work to come later in the program.

May we point out some things you should find helpful as you teach the *Primer* pages; many times a page has been designed for multiple use. That is, in addition to work on the objectives set up for the page, activities are planned for experiences with comparative or quantitative terms and ordinals, as well as for maintenance and for activities in looking ahead to work to come later in the program.

Many pages are color keyed so that when the child is to work horizontally on the page, the exercises running across in a row are not only well separated but are printed in the same color.

When the pupil is to draw objects every effort has been made to insure adequate space for work and the planned work has been kept simple.

Progression on the page has been planned so that the pupil will move from pictures of the real to pictures of the representative to the abstract—that is, from the known to the unknown—from the simple to the more complicated.

Some decidedly helpful items you will discover as you and your pupils make progress through the *Primer* are the number dictionaries in connection with the developmental work on each number, and with the activities for coins; the unusual helps for teaching the writing of figures—such as a starting dot, arrows to indicate the direction in which the pencil is to move, and the guide lines for suggesting top and bottom limits; clear and simple figures; emphasis on simplicity when the child is to draw items; the tie-up with social studies (as safety and communications); progression of work always from easiest to more difficult; and a definite plan in the development of the work with each number.

The Inventory (Primer Pages 1–3)

The work of the first instructional period has been oral and manipulative for the most part. You recently have determined orally the extent to which your children attained the first-period objectives. Now as you turn to the work of the second instructional period, your children will move on to written number experiences which center largely around the pages of the *Primer*.

The first three *Primer* pages afford an opportunity to inventory with written experiences selected existing number abilities at a higher level of performance than could be possible at the beginning of the school year. In each instance the children deal with a pictorial representation. Inventory questions are asked orally, but the child's responses are recorded in written form. More specifically, the following abilities are inventoried:

Page 1: The ability to identify the sizes of groups through 10, both in isolation and in functional settings.

Page 2: The ability to comprehend the ordinal concept through *fifth*, and the ability to reproduce in two different ways groups of items through 10.

Page 3: The ability to compare the sizes of things and of groups.

An inventory record form is suggested below. You will want to make a blank copy of this for use with your class. The use of the symbols will be explained on the succeeding pages.

INVENTORY RECORD									
Name of Pupil	Page 1		Page 2			Page 3			
	Identification		Ordinals	Reproduction		Comparison			
	Functional	Isolated		Drawing	Circling	Functional		Isolated	
						Objects	Groups	Objects	Groups
Billy C.	OK	OK	?	OK	OK	?	0	?	0
Sue D.	?	0	0	OK	?	OK	OK	OK	OK
Jack F.									

CONTENTS of the PRIMER

PAGES		PAGES	
1-3	Inventory	44-47	Experiences with groups to 10
4-5	One-to-one correspondence	48	Chart: groups, patterns, numbers to 10
6-7	Experiences with groups to 3	49	Sequence of numbers to 10
8-15	Experiences with groups to 5	50-51	Hours on the clock
16-17	Coins: cent, nickel	52-53	Coins: cent, nickel, dime
18-19	Writing figures 1, 2, 3; reading words <i>one, two, three</i>	54	Test
20-21	Sequence of numbers to 5		
22-25	Experiences with groups to 6	55-56	Identifying measuring instruments
26	Test	57-58	Component parts of groups to 5 as readiness for addition
		59-65	Discovery of addition facts, sums to 5
27-28	Ordinals to <i>fifth</i>	66	Review of sequence, coins, measures
29	Writing figure 4; reading word <i>four</i>	67-68	Component parts of groups to 5 as readiness for subtraction
30-33	Experiences with groups to 7	69-75	Discovery of subtraction facts, minuends to 5
34-37	Experiences with groups to 8	76	Fractions: $\frac{1}{2}$ of an object
38	Writing figure 5; reading word <i>five</i>	77	Problem-solving
39	Sequence of numbers to 8	78-80	Review and tests
40-43	Experiences with groups to 9		

Text Pages and Lesson Plans, Primer Pages 1-26

Introduction

The lesson plans and reduced *Primer* pages 1-26 that follow are concerned with the first unit of work in which the text is used. Before the work is started, visit with the pupils regarding the *Primer* cover. Note that the activities follow closely the months of the school year. Also, note the progression from 1 to 10 for the items in the panels. You may also want to introduce the pupils to Cappy, their friendly helper who wears a variety of colored caps. See *Primer* page 4 and later pages.

Primer pages 1 to 3 are for inventory purposes. These must necessarily be more difficult than the later pages, so assure pupils that you are only trying to see what they can do. These pages also provide you with information regarding the level at which your pupils can follow directions.

Recording the Inventory Test Results for Page 1

Draw an inventory chart similar to the one suggested on *Teachers' Edition* page 44. After the pupils have completed the work for *Primer* page 1, record each child's status in identification in the following manner:

For each child write "OK" in the first column if he responded correctly to 5 or 6 of the exercises in the first row. Place a question mark (?) after his name if he responded correctly to only 3 or 4 of the exercises. Place a zero (0) after his name if he responded correctly to less than 3 exercises.

Similarly, use the second column (under "Page 1") and the same plan to record each child's degree of success with the second row of exercises.

This record will be of value in anticipating problems with some children in connection with the instruction that follows after page 3 of the *Primer*. The first column on the inventory chart will help you to pick out children who may need some special attention as you systematically study the identification of groups in functional settings on later pages. The second column of the inventory chart will help you in the same way in relation to the later work on identification of groups in isolated settings.

Pupil's Objective. To identify (first orally and then in written experiences) the sizes of groups not exceeding 10 in number, both in functional settings and in isolation.

Pre-book Lesson

1. Direct the attention of all children to the large picture of the schoolroom on page 1. Talk with the children about things they see in the picture: a teacher, a boy and a girl, a table, some chairs, some blocks, some chicks and ducks on the chalkboard, and so on. At this point, avoid use of specific numbers.

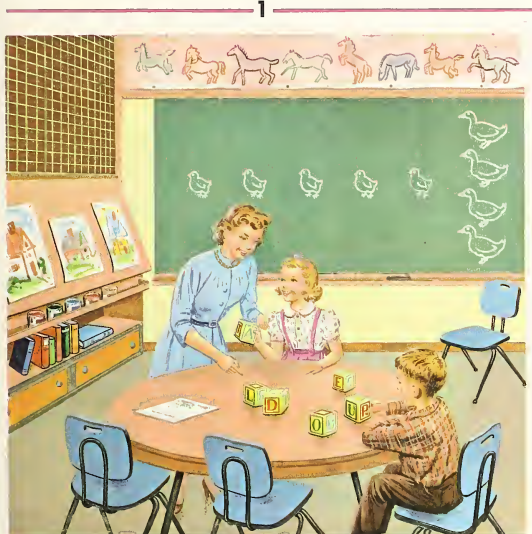
2. Now tell the children to look at the chicks on the chalkboard in the picture. Ask: **Are there 5 chicks drawn on the chalkboard?** Check to see that most children are responding "Yes" orally. Now ask: **Are there six ducks drawn on the chalkboard?** Check the oral responses to see that the children are not only answering "No," but that they realize there are four ducks, not six.

Book Lesson

1. Now direct the attention of the children to the *first row* of single objects below the big picture—the chair, the horse, the paint jar, etc. If there are in the big picture just the number you mention of each item, the pupil is to draw a ring around the item in the little box; otherwise he does nothing in the little box.

a. Have each child put his finger on the chair in the first box but remind him that he is not to count this little chair. Ask: **Are there just 4 chairs in the big picture?** Then, as children

*When you see this symbol, watch for opportunities in the lesson to use the Ginn Arithmetic-Stick described on *Teachers' Edition* page 9.



respond, "Yes, there are just 4 chairs in the big picture," say, **Because there are just 4 chairs in the big picture, you draw a ring around the little chair in the box.** (Demonstrate on chalkboard.)

b. Now have each child put his finger on the horse in the second box but remind him that he is not to count that horse. Ask: **Are there just 7 horses above the chalkboard in the big picture?** As the children say, "No, there are not just 7 horses in the big picture," say, **No, there are not just 7 horses in the big picture so we won't do anything in the little box.**

Move about the room and inspect papers to make sure that your pupils have the correct idea for working and are following the directions.

Explain to the children that you are going to ask them some more questions just like these. If there are *just* the number of things you mention, they are to draw a ring around the object in the box. If not, they do nothing in the little box.

c. Now tell each child to put his finger on the paint jar in the little box. Ask: **Are there just 5 paint jars in the big picture?** If there are just 5 paint jars—just the number I say—draw a ring around the paint jar in the box.

d. Now have the children put a finger on the block in the little box. Ask: **Are there just 6 blocks in the big picture?** If there are just 6 blocks—just the numbers I say—put a ring around the block in the box.

e. Now have the children put a finger on the book in the little box. Ask: **Are there just 5 books in the big picture?** If there are just 5 books—just the number I say—draw a ring around the book in the box.

f. Now have the children put a finger on the house in the little box. Ask: **Are there pictures of just 4 houses in the big picture?** If there are just 4 houses—just the number I say—draw a ring around the house in the box.

2. Now tell the children that they no longer will need to look at the big picture to answer the questions you ask. Instead, they are to answer each question just by looking at the little isolated pictures in the *bottom row* of boxes.

a. Have the children look at the box with the scissors in it. Ask: **Are there just 2 scissors in this box?** If there are just 2 scissors—just the number I say—draw a ring around the scissors.

b. Now have the children look at the box with the crayons in it. Ask: **Are there just 10 crayons in this box?** If there are just 10 crayons—just the number I say—draw a ring around the crayons.

c. Now have the children look at the box with the pencils in it. Ask: **Are there just 8 pencils in this box?** If there are just 8 pencils—just the number I say—draw a ring around the pencils. (These pencils have purposely been made harder to count so you can find the pupils who have trouble when objects are not spread out.)

d. Now have the children look at the box with the erasers in it. Ask: **Are there just 3 erasers in this box?** If there are just 3 erasers—just the number I say—draw a ring around the erasers.

e. Now have the children look at the box with the can of paint brushes in it. Ask: **Are there just 7 paint brushes here?** If there are just 7 brushes, draw a ring around the can of paint brushes.

f. Finally have the children look at the box with the string of beads in it. Ask: **Are there just 9 beads on the string?** If there are just 9, draw a ring around the string of beads.

Record the results. See opposite page.

Teaching Primer Page 2 (Inventory)

Pupil's Objectives: (a) To use orally the ordinals through *fifth*; and (b) to reproduce groups of various sizes through 10.

Pre-book Lesson

1. Discuss the large picture, calling attention to the horses, chicks, and ducks and discuss the position of *first*, *second*, *third*, *fourth*, and *fifth* when reading from left to right as well as when reading from top to bottom.

2. Do work at the board which will be similar to the reproduction work required at the foot of *Primer* page 2: a. Have one child draw at the board a group of 4 balls and another a group of 6 balls; b. place on the board a scattered group of 9 stars and ask a pupil to draw a ring around 6 of the stars.

Book Lesson

1. Now in their books refer the children to the row of horses at the top of the page. Ask pupils to:

- Draw a ring around the third horse from the left.
- Put an X on the fifth horse.
- Put a line under the first horse, starting at the left.
- Put a line over the fourth horse.

2. Refer the children to the chicks being colored by the girls at the chalkboard. Ask the children in the class to:

- Put an X on the third chick from the left.
- Put a straight line over the second chick from the left.
- Draw a ring around the fourth chick from the left.
- Draw a line under the fifth chick from the left.

3. Refer the children to the ducks at the right on the chalkboard. Ask pupils to:

- Draw a ring around the fourth duck from the top.
- Put a straight line under the second duck from the top.
- Put an X in front of the third duck from the top.

4. Now refer the children to the three blank boxes just below the large functional picture. Direct pupils to:

- Draw 5 marbles in the first box.
- Draw 8 marbles in the second box.
- Draw 10 marbles in the third box.

5. Refer the children to the first row of stars near the bottom of the page. Direct pupils to:

- Draw a ring around 5 of the stars in the first box.
- Draw a ring around 7 of the stars in the next box.
- Draw a ring around 6 of the stars in the last box in the row.

6. Refer the children to the final row of stars and give these directions:

- Draw a ring around 8 of the stars in the first box.
- Draw a ring around 10 of the stars in the next box.
- Draw a ring around 9 of the stars in the last box.

Recording the Inventory

Record each child's status in the following manner on the inventory chart prepared previously in connection with using *Primer* page 1.

Use the third column, headed "Ordinals," to indicate the degree of success with this idea. If the child made no more than one error in each of the three experiences with ordinals, write "OK" in this column. If he made two or more errors in any of the three exercises, place a question mark (?) in this column. If

he made two or more errors in more than one of the three exercises, place a zero in this column.

If the child made no errors in reproducing the three groups of balls, write "OK" in the "Reproduction" column headed "Drawing." Place a question mark (?) in this column if he made one error, and a zero if he made two or three errors.

If, in the two rows, the child encircled 5 or 6 of the groups of stars correctly, write "OK" in the "Reproduction" column headed "Circling." Place a question mark in this column if he made two or three errors. Place a zero in this column if he made more than three errors.

As with *Primer* page 1, use the record to anticipate problems some children may have in connection with future instruction.

NOTES

2



★★★★★★	★★★★★★	★★★★★★
★★★★★★	★★★★★★	★★★★★★

Pupil's Objective. To compare sizes of groups and of objects, both in functional settings and in isolation.

Pre-book Lesson. Discuss the large picture with the children, identifying the various things that are pictured. Emphasize that there are more of some things than of others and that things of the same kind differ in size.

Book Lesson

1. *a.* Ask the children to look at the rabbits in the pen. Then say, **Put X on the larger rabbit.**

b. Ask the children to look at the monkeys in the cage. Then say, **Put X on the smaller monkey.**

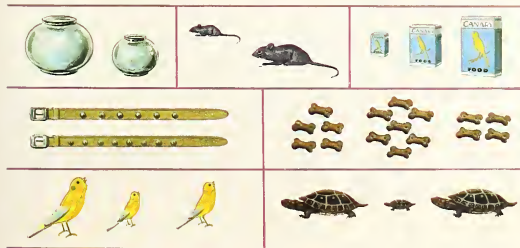
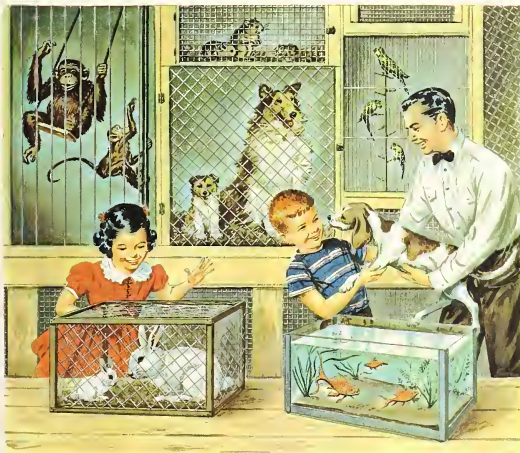
c. Ask the children to look at the hamsters in the top cage. Then say, **Put X on the littles hamster.**

d. Ask the children to look at the fish in the tank. Then say, **Put X on the biggest fish.**

e. Now ask the children to look at the group of birds and the group of rabbits. Then say, **Draw a ring around the smaller group.** Make it clear that the child is to circle the group having the smaller number of things in the group—not smaller in terms of size of objects.

f. Ask the children to look at the dogs in the cage and the fish in the tank. Then say, **Draw a ring around the larger group.** Make it clear that the child is to circle the group having the larger number of things in the group—not larger in terms of size of objects.

3



2. Now have the children look at each of the boxes below the big picture. Have them identify the things in each box. Then proceed, box by box, with the following directions:

a. In the box with the two fish bowls, put X on the larger bowl.

b. In the next box, put X on the smaller mouse.

c. In the last box in the row, put X on the biggest box of bird seed.

d. In the first box in the next row, put X on the collar with the fewer "buttons" on it.

e. In the other box in this row, draw a ring around the group having the most biscuits in it.

f. In the last row, the first box, put X on the littles bird.

g. In the last box in this row, put X on the turtle that is just as long as the first turtle.

Recording the Inventory

Comparison of objects in functional setting: Questions 1 *a*, *b*, *c*, *d*.

Write "OK" in this column of your inventory record if all 4 questions are answered correctly.

Put a question mark (?) in this column if 2 or 3 questions are answered correctly.

Put a zero (0) in this column if less than 2 questions are answered correctly.

Comparison of groups in functional setting: Questions 1 *e* and *f*.

Write "OK" in this column if both questions are answered correctly.

Put a question mark in this column if only 1 question is answered correctly.

Put a zero in this column if no question is answered correctly.

Comparison of objects in isolated settings: Questions 2 *a*, *b*, *c*, *f*, *g*.

Write "OK" in this column if 4 or 5 questions are answered correctly.

Put a question mark in this column if 2 or 3 questions are answered correctly.

Put a zero in this column if less than 2 questions are answered correctly.

Comparison of groups in isolated settings: Questions 2 *d* and *e*.

Write "OK" in this column if both questions are answered correctly.

Put a question mark in this column if only 1 question is answered correctly.

Put a zero in this column if neither question is answered correctly.

Use this inventory as a basis for anticipating problems with specific children when comparison ideas are treated systematically later in the teaching of the *Primer* pages.

NOTES



Pupil's Objective. To learn how to match given groups of objects by bringing others into one-to-one correspondence.

Background. Prior to the time that pupils match number symbols with objects, they need to sense the idea of matching one-to-one. In this lesson, the matching of related objects, real or pictured, provides this needed experience.

Help children remember that the little black bird's name is "Cappy" because he likes to wear so many kinds of caps.

Pre-book Lesson

1. Actual pupil participation: Line up 4 children. Let each child get a partner and hold his partner's hand. Help children to discover that there is exactly one partner for each child.

2. Class participation: Line up 8 children along the wall, and ask a child to give each one a partner, so that there will be exactly one partner for each child.

3. Object handling: Lay 6 sheets of paper at intervals around a table. Tell a child: **Put a crayon at each place, so that when you are through there will be exactly one crayon for each sheet of paper.**

4. Preparation for *Primer* page 4, Ex. 1-4: Draw 5 doors on the chalkboard. Have someone put a doorknob on each door. Ask the class: **Did he do what I asked him to do? Did he draw exactly one doorknob for each door?**

5. Preparation for *Primer* page 4, Ex. 5-9: Draw 6 pails on the chalkboard. Have a child draw an egg under each pail, so there will be an egg for each pail. Check by drawing a line from each pail to its matching egg.

Book Lesson

1. Say: **Do you see the kites at the top of the page?** (Point, if necessary.) **Have they tails? Suppose you draw a tail on each kite. Our friend, Cappy, is showing us what to do with the first one. Help him put the tail on the first kite (that is, trace over the dotted line). Then do each of the others yourself. Draw just enough tails. Each tail must be on a kite, and each kite must have a tail.** Inspect the work to see that the directions are being followed.

2. **Next is a picture of some Thermos jugs.** (Point, if necessary.) **Put a handle like this (illustrating on board) on each jug. Draw just enough handles to give each jug its own handle.** Inspect the work as before.

3. **The ice cream cones in the next row have no ice cream.** Appropriately instruct the children to put a scoop of ice cream on each cone, illustrating the procedure at the chalkboard.

4. **The caps in this row have no buttons.** Have the children put a button on each cap, illustrating at the board.

5. In all five of the remaining exercises, balls are to be drawn to give each racket, bat, and the like its own ball. Therefore, give general directions to cover all these exercises, which then can be done as independent seatwork. Move about among the children, giving help as needed. Be certain that the children understand that there is only one exercise in the third row, whereas there are two exercises in the fourth row and two in the fifth.

Differentiations and Extensions (regrouping the class)

1. If the paper-and-pencil exercises of the *Primer* are too difficult for the *slower learners*, organize activities like those on *Primer* page 4 in which you use standard, or classroom, materials. Lay out 5 or 8 objects of some kind, and have these children match them item by item with objects of another kind. Continue

in this way, using groups of varying size (5 to 10 objects), until these children are ready for the *Primer* page.

2. Again, for the *slower learners*—or for any children for whom you want more practice in the form of seatwork—mimeograph pages of exercises similar to those on page 4 of the *Primer*.

3. For a time with *all pupils*, instead of saying: **Doris, please bring five pairs of scissors to this table,** say: **Give each of the children at your table a pair of scissors. Give just one pair to each child, so that there will be as many scissors as children.** The purpose is to give practice in matching and in understanding one-to-one correspondence without the use of number words and to provide such practice in natural settings.

4. After the children have completed the exercises on *Primer* page 4 (or the supplementary mimeographed pages), the page may be used for oral discussion involving the cardinal number words. For example: **How many kites are there, Ted? How many tails did you draw? . . . Do the numbers tell us that you drew as many tails as there are kites? etc.**

*Remember: When you see this symbol, watch for opportunities in the lesson to use the *Ginn Arithme-Stick* described on *Teachers' Edition* page 9.

4



Pupil's Objective. To learn more about one-to-one correspondence through matching groups by (a) supplementing the number of objects in a group which is too small and (b) eliminating extra objects from a group which is too large.

Pre-book Lesson

1. Class participation: Align four children along the wall. Place two chairs immediately in front of the first two children. Ask someone to be sure that there is one chair for each child. Repeat the experience with other groups.

2. Preparation for *Primer* page 5, Ex. 1-4: Draw 5 flower pots on the chalkboard, with a bulb directly under each of the first two flower pots. Say: **We want to plant a bulb in each pot. Have we enough bulbs? What must we do? Who wants to show us?** (Have a child draw the needed bulbs.) **Now have we enough bulbs? (Check by drawing lines from pots to bulbs.) Have we as many bulbs as we have flower pots?**

3. Preparation for *Primer* page 5, Ex. 5-9. Seat 3 children at a table on which there are 5 books. Have each child take one book. Ask: **Does each child have a book? Did we have too many books to start with? Did we need them all?**

Repeat with 6 children and 10 books.

4. Draw a row of 4 fishbowls and underneath a row of 7 goldfish. Have someone erase goldfish so there will be just one for each bowl. Have him prove it by drawing lines between bowls and fish.

Repeat with rows of 6 oranges and 10 saucers.

Book Lesson

1. For the first exercise, explain that there is to be a sand shovel for each sand pail and ask what needs to be done. When you receive the suggestion to draw more shovels, have the children help Cappy finish the shovel he is drawing and the other two Cappy would still have to draw. When they have completed the work, discuss it as a check. Let pupils draw a line between each pail and a shovel to find out whether there is one shovel for each pail.

2. Explain what is to be done in the next three exercises, involving pieces of paper and pencils, feathers and hats, and bows and arrows. In each instance the child is to draw more of the thing in the lower row (pieces of paper, hats, arrows), so that there will be enough to match each object in the upper row (pencils, feathers, bows). Have the children complete the work independently, while you move about to inspect it and to help as needed. Tell the children to stop when they reach the wider gray line. If necessary, discuss the work.

3. For the fifth exercise where there must be some crossing off in order to get one-to-one correspondence with the plates, discuss what Cappy seems to be doing. Emphasize that, in this exercise and those that follow on the remainder of the page, we want to have as many items in the second row as appear in the first row, so we must cross out the extra items in the second row. Have the children help Cappy cross out the unneeded items and then discuss the work as deemed necessary.

4. Examine with the children the four remaining exercises. When they understand what they are to do each time—always to cross out any extra objects in the lower row—allow them to complete the work by themselves. Circulate among the children, giving help and discussing the work as needed.

Differentiations and Extensions

1. For children who do not see how to do the *Primer* exercises, organize practice with standard materials. For experiences in increasing a group too small to equal a larger group, arrange 4 or 6 or 9 objects of some kind in a row on a table, with a smaller number of other objects below. (Have more of these latter objects readily available.) Then have the children match the two series, item by item. They readily will see that they need more objects of the one kind, and will procure the necessary number on a one-to-one basis. Experiences in rejecting objects from a group which is too large can be set up for practice in a similar way.

2. Also, provide the *slower learners* with extra paper-and-pencil practice of the *Primer* type (a) in increasing groups or (b) in reducing groups or (c) in both. Model mimeographed pages after those of *Primer* page 5.

3. For *more capable children* interesting seatwork can be provided by mimeographing exercises in which the two kinds of matching (by increasing and by reducing) occur in random order.

4. What is learned on this page has many applications which can be discussed with *all children*. One interesting application involves both increasing and reducing in the same experience. For example, suppose that there are to be two groups of children formed for a game, with the same number of children in each group, but at the outset there are more in one group than in the other. In matching the groups, the one is increased while the other is decreased. (Use even-numbered groups.) Call attention to such natural applications when they occur, and arrange that other occasions for practice in natural settings will arise.

5

Pupil's Objectives: (a) To develop the ability to differentiate among single objects, groups of 2, and groups of 3, identifying each in relation to its number symbol; (b) to learn about the relative sizes of single objects, groups of 2, and groups of 3.

Background. This is the first page of a two-page unit dealing with single objects and groups of 2 and 3 objects. On *Primer* page 6, emphasis is placed upon *identifying* how many of a thing and recognizing the related number symbol which tells how many. On page 7, emphasis is placed upon *reproducing* a specified number of things (1 or 2 or 3) by selecting them from a group of larger size. The amount to be reproduced (selected) is indicated by the figure 1, 2, or 3 which appears in the upper left corner of the particular box.

Teacher's Preparation. Have available 6 each of several familiar objects; for example, 6 blocks, 6 balls, 6 chairs, 6 books, 6 pencils, 6 chalkboard erasers. Also have at hand several sets of *Picture Number Cards* for 1 and groups of 2 and 3. (See page 12 of the *Teachers' Edition* about directions for making these cards.)

If you wish to begin construction of a *Number Dictionary Card* for class use, refer to *Teachers' Edition* page 13 for suggestions.

Pre-book Lesson

1. Place a single chair, a group of 2 chairs, and a group of 3 chairs at the front of the room. Elicit from the children how many chairs there are in each of the three instances: 1, 2, 3. Point to the single chair and to the groups of 2 and 3 in random order, each time asking **How many?** Then ask questions such as: **Which is more—2 chairs or 1 chair? 2 chairs or 3 chairs? 3 chairs or 1 chair?**

2. Put 1, 2, and 3 books on a table. Again have children identify "how many" in each instance. Now mention that we have another way to tell "how many"—by written or printed numerals, or figures. Show the figures 1, 2, 3 (along the chalk rail, for example). Elicit from the children the oral word associated with each symbol: *one, two, three*. Then point to the single book; ask a child to show you the numeral that tells how many. Do the same with the group of 2 books and the group of 3 books. Then point to the sets of books in random order. Have one child say "How many?" Have another child pick the numeral to tell "how many."

3. Continue in a similar manner with the blocks, balls, pencils, and chalkboard erasers.

Book Lesson

1. Discuss the postman, the policemen, and the firemen in the number dictionary at the top of the page and the ways these men help us and are our friends.

2. Refer now to the three pictures that constitute the number dictionary at the top of the page. Have the children identify orally how many postmen are shown in the first picture, how many policemen in the second, and how many firemen in the third. Call attention each time to the related number symbol in the upper left corner of the picture.

3. Now refer the children to the first of the smaller pictures showing the fire engines. Ask how many fire engines there are. Direct attention to the fact that Cappy has already finished his work by drawing a ring around the figure 2 to tell how many. Have pupils trace over Cappy's work. Next refer to the picture of the helmets. Again ask how many. Then direct attention to the fact that Cappy has started to show us which figure tells how many. Have the children complete drawing solid rings around the 2 and the 3 where Cappy is working.

Discuss one or both of the remaining two boxes in the row

and then instruct the children to proceed independently with the remaining boxes.

4. Refer the children again to the pictures at the top of the page. Develop the idea that 2 is one more than 1 and that 3 is one more than 2. Then provide the following oral experiences dealing with the comparison of group sizes:

a. Look at the row of pictures of the postman, the policemen and the firemen.

**Are there more firemen than policemen?
Are there fewer policemen than postmen?**

b. Look at the next row of pictures: the fire engines, fire hats, fire axes, and fire alarm box.

**Are there more fire engines than fire hats?
Are there just as many fire axes as fire engines?
Are there fewer fire boxes than fire hats?**

c. Look at the next row of pictures: the letter, the postmen's hats, the mail bags, and the R.F.D. boxes.

**Which box has the most things in it?
Which box has the least things in it?
Which two boxes have the same number of things in them?**

d. Look at the last row of pictures: the police car, policemen's hats, billy clubs, and police boxes.

**There are more of which: police hats or billy clubs?
There are less of which: billy clubs or police boxes?
Are there just as many police hats as there are police boxes?**

6

1 	2 	3 
 1 2 3	 1 2 3	 1 2 3
 1 2 3	 1 2 3	 1 2 3
 1 2 3	 1 2 3	 1 2 3
 1 2 3	 1 2 3	 1 2 3

Pupil's Objective. To develop the ability to find one thing, two things, or three things in a larger group.

Teacher's Preparation. Have available 5 envelopes of the same size that have been received through the mail.

Pre-book Lesson

1. *Playing Postman.* Place the 5 envelopes in any regularly arranged group on a desk. Ask a child to select 2 of them to give to another child. In a similar manner place 4 or 5 envelopes on a desk in patterned arrangements. In each instance ask a child to select 1 or 2 or 3 envelopes to give to another child.

2. Follow a procedure similar to the above, but with one exception. Instead of stating orally how many envelopes are to be selected, write the figure 1 or 2 or 3 on the chalkboard to indicate the number of envelopes to be selected.

Book Lesson

1. Direct the children's attention to the groups of envelopes at the top of the page. Then have the children point to the first box at the left. Ask the children what the little figure in the upper left-hand corner of the box tells them. (The number of envelopes to be selected.) Ask the children how Cappy showed that he had chosen 3 envelopes. (By drawing a ring around 3 of them.) Have the children trace over the dashed ring.

2. Refer to the next box. In like manner, have the children tell that the figure, 2, shows that 2 envelopes are to be selected. Have them help Cappy by using their pencils to trace over the dashed ring and then proceed in the row.

7

3 	2 	3 	1
2 	3 	1 	3
2 	1 	2 	3
3 	1 	3 	2

3. Have all the children work together on the next two boxes in this row. Check to be certain that each child has worked correctly.

4. Have the children tell that the boxes all show police whistles in the next row, police badges in the row after that, and uniform buttons in the last row. Make it clear that for each box the child is to follow the procedure he used in the first row,—draw a ring around the number of objects called for by the figure in the upper left-hand corner of the box. Have the children work independently on the remaining part of the page. Circulate among them and give help as needed.

Differentiations and Extensions

1. For the *slower learners* who need further practice in this reproduction experience, prepare a work sheet similar to *Primer* page 7, this time using various representative items: circles, triangles, squares, and so on.

2. *More capable children* who have a special interest in this type of activity may make drawings using various representative items in several ways so that a group of 2 or 3 may be selected from a patterned arrangement of 3 or 4 or 5.

3. Make use of this page for oral maintenance experiences in *comparison* of the sizes of objects:

Look at the row of envelopes, the row of whistles, the row of badges, and the row of buttons.

Which things are largest: the envelopes, the whistles, the buttons, or the badges?

Which things are smallest: the envelopes, the whistles, the buttons, or the badges?

Are the whistles smaller than the envelopes?

Are the buttons larger than the badges?

LOOKING AHEAD

Looking-Ahead oral experiences will be inserted from time to time so that you can give your pupils oral developmental experiences to prepare them for written experiences to come later in the program. The sections below provide oral, manipulative experiences with the ordinal concepts of *first*, *second*, and *third*.

1. Have three children stand in line at the front of the group you are working with. Moving from left to right, have each child identified by name (Billy, Jane, Jack). Then tell the children that there are *number names* we could use to tell which of the children we are talking about. Again beginning at the left, ask what number name we might use with each child. Solicit the answers *first*, *second*, *third*. (Tell these number names to the children if they are not known.)

2. Now have three other children replace the ones used previously. Ask: **Who is first? Who is second? Who is third?**

3. Ask similar questions with 3 other children but not in sequential order; that is, ask: **Who is second? Who is first? Who is third?** Repeat with other children, asking the questions in a different order.

4. Have three children at the front of the room. Ask someone to give a book to the second child. Ask someone else to give a pencil to the first child. Ask which was given nothing.

5. Now put three blocks on a table (in a line). Ask one child to point to the second block. Ask another child to point to the first block. Ask another child to point to the third block.

6. Provide a similar experience using four books or other objects (in a line).

7. Avail yourself of opportunities to use the ordinals *first*, *second*, and *third* in relation to a variety of objects and activities within the classroom environment.

Pupil's Objectives: (a) To learn to read numerals 1, 2, 3, 4, and 5; (b) to learn to identify standard patterns for groups to 5; (c) to identify groups to 5 in a functional picture; and (d) to learn that 4 is one more than 3 and that 5 is one more than 4.

Background. *Primer* page 8, with its number dictionary and interesting functional picture, provides an opportunity for oral inventory of knowledge of the numbers through 5. It will probably be necessary with *all children* to do some work in the recognition of the patterned arrangements of groups to 5.

Note that the figures used on *Primer* page 8 are of the handwritten kind rather than that used in printed matter; for example, 4 and not 4. The differences in form are not so great for the figures through 5 as they are for larger numerals; but there is no point in introducing both kinds at this time. Confusion should be avoided.

Teacher's Preparation

1. A class *Number Dictionary Chart* is a convenient and useful aid. See a description of such a chart on *Teachers' Edition* page 13.
2. *Picture Number Cards* and *Pattern Number Cards*, both large and small sizes, are excellent for class use and for individual flash-card practice. See a description of such cards on *Teachers' Edition* pages 12–13.

Pre-book Lesson

1. Arrange the *Picture Number Cards* for 1, 2, 3, 4, 5—numeral side out in random order on the chalkboard ledge. Have children volunteer to identify them. Rearrange and repeat.
2. Repeat the above activities but use the *Pattern Number Cards*.
3. Have children identify arranged groups in the classroom.

Book Lesson

1. Direct attention to the number dictionary at the top of the page and discuss it with the children. Emphasize that each group in the sequence is one more than the group before it. Give special attention to 4 as one more than 3 and to 5 as one more than 4. (This dictionary can be used for reference as needed in the exercises that follow.) Lead the pupils, if you can, to tell you that the figure 2 (or 3 or 4 or whatever) may be used to stand, for instance, for the 2 ducks or the 2 stars or 2 of anything.
2. Discuss the arrangements of the stars in each standard pattern (1 to 5) as these will be used in the *Primer* for pictures of the structured groups of representative items. Discuss also other patterns but conclude with the idea that these are the patterns we shall use most.
3. Discuss the large picture on *Primer* page 8, asking the children to identify by name (though not by number) the various things which make up groups, such as trees, girls, and so on. Then ask: **How many planes are there in the sky? . . . How many cars do you see? . . . How many boys are on the jungle gym?**—these and similar questions relating to the groups.

Differentiations and Extensions. *Primer* pages 9–11 will provide many experiences to develop the ability to read numerals and identify patterns; but it may be as well to suggest here (though you may use the suggestions later) several types of experience for practice.

1. *Individual practice.* Organize practice for identification with the *Picture Number Cards* and the *Pattern Number Cards*.

2. *Games.* The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Knock, Knock*; *Zooks*.

Obviously, as in the case of the seatwork suggested below, the range of numerals used can be extended as new ones are learned.

3. If *seatwork* is needed, provide mimeographed sheets containing patterns for several different groups to 5 and corresponding numerals like those at the right. The children are to draw lines from the numerals to the boxes containing the corresponding patterns.

This *seatwork* may be varied (a) to require the finding of a pattern in the empty box to correspond with the figure beside it; or (b) to present the pattern in the box with three numerals below it so that the pupil may ring the correct numeral for the pattern.

4. Provide the following comparison experiences:

a. Look at the pictures of the ducks and the pictures of the stars at the top of the page.

Which are larger—the ducks or the stars?

b. Now look at the big picture below the ducks and the stars.

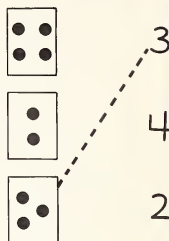
Which are higher—the airplanes or the boys?

Which are lower—the boys or the girls?

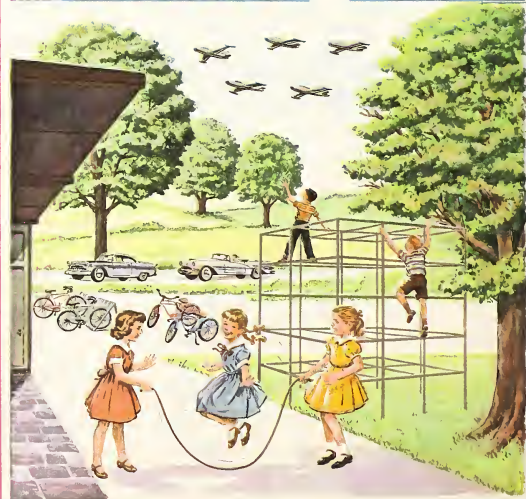
Are there more bicycles than airplanes?

Are there fewer trees than cars?

Are there as many bicycles as children?



1			1
2			2
3			3
4			4
5			5



Pupil's Objectives: (a) To get experience in identifying groups to 5 using the number symbols; and (b) to compare the relative sizes of groups through 5 when they appear in isolation.

Background. In this lesson you will have a chance to see how much understanding your pupils have gained in reading the numerals to 5 and in recognizing the standard patterns for groups to 5. Note that as the pupils move from guided oral experiences on *Primer* page 8 to written experiences on page 9, the items are in isolation instead of in a complex social setting.

Pre-book Lesson

1. Write the numerals to 5 in irregular order on the board. Hold up 2 or 3 or 4 or 5 fingers on one hand, and have the children go to the board and point to the correct numeral each time.

2. Point to groups of 2 or 3 or 4 or 5 objects in the classroom. Again have the children identify the number by indicating the correct numeral on the board.

3. Make a drawing of 5 kittens (or other objects) on the board, with the numerals 1 to 5 written underneath. Have someone go to the board and encircle the correct numeral (as will be done in the *Primer* exercises).

4. Have the children close their eyes while you erase one or more of the objects in your drawing. Again have the correct numeral on the board encircled.

5. Repeat items 3 and 4 using groups of representative objects such as disks arranged in regular patterns for 2 or 3 or 4 or 5.

Book Lesson

1. Help the children with the first exercise or two, leaving them to their own devices for the rest of the exercises as soon as you think them ready to work independently. You may even want to see if the children can tell what to do on this page by seeing what Cappy is doing.

2. When the work of the first three rows (for pictures of real objects) has been completed, check the encircled numerals for correctness, noting the children who need special help.

3. In the last three rows, give special attention to the regular patterns for 3, 4, and 5. Make use of the *Pattern Number Cards* for flash-card practice.

4. Provide the following experiences in relation to the comparison of objects and groups:

a. Look at the pictures of the things in the two rows at the top of the page.

Which is the largest thing you see there?

Which box has the most things?

Which box has the least things?

Are there as many footballs as pocketbooks?

Are there more ice skates than dolls?

Are there fewer pocketbooks than ball gloves?

b. Now look at the row of balls.

Are there more balls in the first box than in the last box in this row?

In which box in this row are there the most balls?

In which box in this row are there the least balls?

c. Now look at the row of dots. (Draw a dot on the chalkboard if necessary.)

Are there fewer dots in the first box than in the last box in this row?

Are there more dots in every other box in this row than there are in the first box?

Differentiations and Extensions

1. Mimeograph exercises like those on *Primer* page 9 for extra seatwork or practice as seems desirable. For *slower learners*, make use of any of the teaching suggestions offered in connection with the preceding *Primer* page.

2. *Slower learners* who need further comparison experiences will be helped by the following, which utilize geometric forms in the last two rows of the page in the pupil's book:

a. Now look at the row of oblongs. (Draw an oblong on the chalkboard if necessary.)

Are there just as many oblongs in the first box as in the last box in this row?

In which box are there the most oblongs?

In which box are there the least oblongs?

b. Now look at the row of triangles. (Draw a triangle on the chalkboard if necessary.)

Are there fewer triangles in the first box than in the last box in this row?



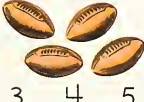






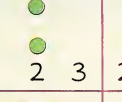
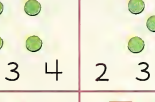
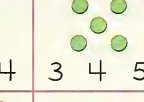


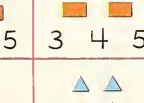
In which box are there just as many triangles as in the first box?

In which box are there the most triangles?

3. Have *all pupils* identify various groups that will be *one more* than specific groups you indicate.

4. Have *more capable children* identify various groups that are *two more* or *three more* than specific groups you indicate.

9

 1 2 3 4 5	 1 2 3 4 5	 1 2 3 4 5
 1 2 3 4 5	 1 2 3 4 5	 1 2 3 4 5
 1 2 3 4 5	 1 2 3 4 5	 1 2 3 4 5
 1 2 3 4 5	 1 2 3 4 5	 1 2 3 4 5
 1 2 3 4 5	 1 2 3 4 5	 1 2 3 4 5

Pupil's Objectives: (a) To develop the ability to identify groups through 5 in functional settings rather than isolated ones, indicating the size of each group by circling the correct numeral; and (b) to learn to compare the sizes of groups through 5 when they appear in functional settings.

Pre-book Lesson

Talk with the children about farm experiences they may have had. Give special attention to various things in the picture—barn, milk cans, cows, dogs, hens, pigs, silos, milk pails, corn shocks, trees.

Book Lesson

1. Continue discussing the picture orally with the children. Ask them:

How many cows do you see in the picture?

How many trees do you see in the picture?

2. Use the first box with Cappy to indicate what the children are to do independently. Refer them to the box with the cow and the figures 1, 2, 3, 4, 5 following it. Ask them again how many cows they see in the big picture (4). Have them help Cappy by completing the dashed ring around the 4 to tell that there are this many cows in the picture.

3. Have the children work the rest of the page independently. Before doing so, however, clarify just what is to be identified in each instance:

the number of dogs
the number of milk pails
the number of milk cans
the number of silos
the number of corn shocks
the number of trees
the number of hens

Circulate among the children as they are working, giving help as needed.

4. Have the children answer these questions orally in relation to the farm picture for oral maintenance in comparison.

Are there more cows or more hens in the picture?

Are there fewer milk cans than milk pails?

Are there more trees than corn shocks?

Are there fewer pigs than cows?

Differentiations and Extensions

1. If some of the *slower learners* need further experience with group comparisons in functional settings, go back to the picture on *Primer* page 8 and ask questions similar to those asked about the picture on *Primer* page 10.

2. Have *all pupils* make various group comparisons (through groups of 5) as groups appear in the functional classroom setting.

3. Have your *more capable children* make *exact* comparisons with groups in functional settings—for instance, "The reading group has two more boys than girls."

10



	1 2 3 4 5		1 2 3 4 5
	1 2 3 4 5		1 2 3 4 5
	1 2 3 4 5		1 2 3 4 5
	1 2 3 4 5		1 2 3 4 5

Pupil's Objective. To learn how to reproduce as many as 5 objects, when given the numeral that stands for the size of the group to be reproduced: (a) by drawing the entire group; and (b) by enlarging a given group of objects.

Background. You will recognize the difference between the activities in this lesson and those in the preceding one. Here the children are given a numeral (and so get further practice in reading the numerals, and for a purpose) and are asked to supply that number of objects. Two types of reproduction are called for. At the top of the page the children draw *all* the objects to represent the number; at the bottom, only enough objects to complete a group that is already started.

Pre-book Lesson

1. Write the numeral 3 or the numeral 5 on the board. Ask the children to find that number of objects of some kind in the classroom.

2. Write a numeral between 1 and 5 on the board and say, **Show me that many fingers.** Check for accuracy.

3. Write the numeral 3 on the board, hold up one finger only, and ask: **Have I shown that many? What must I do?**

4. Repeat, writing 4 or 5 and showing too few fingers.

5. Write the numeral 4 on the board, and draw 2 cherries. **Have I shown that many cherries? What must I do? Who will do it?**

Book Lesson

1. In the first half of the page, the children are to reproduce the entire group called for by the numeral. Help with the first

exercise or the first two exercises on the page. Have the pupils finish what Cappy has started in the first box. Then have the children complete the other exercises in the first series. Move about the room, inspecting and helping as necessary. Discuss with the class what they have done before starting work in the bottom part of the page where they are to complete groups already started.

2. Try to elicit from the children what is to be done in the first exercise with the pails (trace over the dashed lines to finish the indicated group of 2). Have them try the next exercise themselves in which they increase the 4 given pails by drawing 1 more, to make 5. Discuss the work. When the children show they can move ahead, have them complete the page.

Differentiations and Extensions

1. If necessary, provide extra practice or seatwork modeled on the two types of reproduction on *Primer* page 11. For the *more capable children*, prepare exercises in which the two types are mixed together.

2. From now on, to the extent possible, write on the board the numerals 1 to 5 in giving directions for work and, when occasion permits, have pupils bring to you the number of objects specified. Do not limit this activity to the arithmetic period only.

3. For *all children* extend the work of reproduction to sounds (whole group and completion of group) by using some of the following and similar activities (calling on one child at a time).

For the number of times shown by the numeral written on the board or on a flash card tell a pupil to

- clap your hands.
- ring a bell.
- say the word "Sam."
- tap your desk with a pencil.

Reminder. In free periods of four or five minutes now and then, are you asking children to perform simple number tasks with real objects and representative materials?

NOTES

11	
2 	4
1	3
5	2
12	
2 	5 
4 	3 
5 	4 
3 	5 

Pupil's Objective. To develop further the ability to reproduce groups through 5 by drawing enough more of an indicated item.

NOTES

Pre-book Lesson. Preparatory to work with this page and the following one, talk with the children about the idea of cleanliness. Ask them about some of the things they use to help keep themselves clean and neat. Emphasize things found on these two pages: soap, washcloth, towel, sponge.

Book Lesson

1. The nature of the activity is identical with that used in the lower half of the preceding page. In each box the child is to draw enough more of the given object to have as many in all as are indicated by the figure in the upper left-hand corner of the box. Remind the children of what they did on the previous page and use the first box at the top of this page for further illustration. Have the children sense that 4 wash cloths are to be shown, that 3 are there, and that Cappy is drawing the 1 more that is needed. Have the children trace over the dashed line that Cappy is drawing, outlining the shape of the wash cloth. (Details are not important in drawing; only the major outline of a given object is of consequence.)

2. Have the children work through the exercises on this page independently. The first three rows show pictures of real objects and the last row takes a step toward the abstract, through using simple triangles. Use the word *triangles* and in this way again call attention to this geometric form. Circulate among the children to answer questions and take care of difficulties as needed.

Differentiations and Extensions. For those who need further practice, pattern extra practice after the last row of exercises on this page. If you wish, use other geometric forms,—circles, oblongs, squares, and so on.

12			
4		2	
5		3	
5		4	
2	△	4	△
	△	3	△
		5	△ △
			△ △

Pupil's Objective. To develop the ability to reproduce groups through 5 by selecting a specified number of things from a group of larger size.

Background. This is not a new type of activity for the children. They already have done this kind of thing on *Primer* page 7, but then only to reproduce groups as large as 3.

Pre-book Lesson

1. Write on the board one of the numerals from 1 to 5 and ask a child to bring you that many pieces of chalk from a pre-arranged larger group.

2. Have 6 or 7 children stand along a wall and ask another child to select from the group a smaller group (for example, 2 as recorded on the board) to go to their seats.

3. Prepare some board work similar to the exercises on *Primer* page 13 and have one child at a time work on the board exercise to reproduce a specified group.

Book Lesson. Have pupils turn to *Primer* page 7 to see how they did the work there. Then have them describe what Cappy is doing in the first box on page 13: drawing a ring around 2 of the combs in the group because the numeral in the upper left corner is 2. Have the children help Cappy by tracing over the dashed ring he is drawing. Encourage the children to work the remaining exercises on the page independently. Circulate among the children, giving appropriate help as needed. The first four rows of boxes contain pictures of real items and the last row introduces groups of stars, a more representative kind of picture.

Differentiations and Extensions. If *slower learners* are having trouble, let *more capable children* use representative objects to provide experiences in reproducing from a group too large. Then have further experiences with pictures of triangles and squares.

LOOKING AHEAD

1. It is to be expected that most children will be able to count at least as far as 10, both by rote and rationally (for purposes of enumeration), at this point in the instructional program. Your earlier inventory (*Primer* page 1) will give an indication of this. Some children still may not possess these desired counting abilities.

a. Provide opportunities for them to count groups of 6, 7, 8, 9, and 10 things. If the number series is known but children are unable to apply it effectively to find "how many" in a group, be certain that in counting objects the children do more than merely touch each object in turn. Have them move each succeeding object with those counted previously. This will help children to look upon a number name such as *eight* as not just the name of a single object, but the name of a group of things.

b. If difficulty is encountered with the serial order of numbers as far as 10, use songs and rhymes such as "Ten Little Indians," "One, two, button my shoe," etc., as an aid in developing rote counting, along with the above suggestions.

2. Develop the counting series, 11 through 20, in a rational setting by counting objects.

a. Beginning with a group of 10, keep putting 1 more with the group as the number names for 11 through 20 are established. Some children already will know this sequence. Use them as helpers for the other children.

b. When working with groups of 11, 12, 13, etc., show them as a group of 10 and some more. Do not develop the tens-and-ones concept as such, but let the grouping of objects suggest this idea which will be developed systematically in *Book One*.

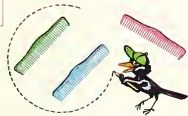



















c. Help children to see how the number names beginning with *thirteen* are very much like the number names *three* through *nine*. This is a very helpful way to assist children in learning and applying the counting sequence in the second decade.

d. Ask the children to tell the numeral that comes after 16; after 11; after 14; etc.

e. Ask the children to begin with a numeral such as 7 and count on from there to 20 or to some indicated point earlier in the counting series.

NOTES

13

<div style="text-align: center; margin-bottom: 5px;">2</div> 	<div style="text-align: center; margin-bottom: 5px;">4</div> 				
<div style="text-align: center; margin-bottom: 5px;">3</div> 	<div style="text-align: center; margin-bottom: 5px;">5</div> 				
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Pupil's Objective. To practice reproducing the numbers to 5 (*a*) by increasing groups too small; and (*b*) by selecting the correct numbers from groups too large.

Background. There is nothing particularly new on the page. Your pupils will have had both types of experience needed for the exercises. This page is important not only in connection with a review of two types of reproduction studied thus far, but also as a readiness experience for a new type of reproduction introduced on *Primer* page 15.













Book Lesson. Cappy has already started to work in the first box in each section. Probably all the help your pupils will need is in connection with the first exercise or two. Checking after independent attempts on the second or third exercise in each case will enable you to tell.













Differentiations and Extensions

1. Extra practice and seatwork as desired or needed can be patterned after the exercises on the *Primer* page.

2. As a more challenging exercise for *more capable children*, prepare practice material in which the two forms of reproduction used on this page appear in a mixed order. The child must then decide in each exercise which of two things he must do to reproduce the group of indicated size,—draw enough more of the given objects or draw a ring around only a portion of the given objects. Occasionally have as many as 15 in the group that is too large.

14

<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">5</div> 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">2</div> 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">3</div> 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">4</div> 
<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">2</div> 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">5</div> 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">4</div> 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">5</div> 
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Pupil's Objective. To develop the ability to reproduce groups through 5 by combining all of one group with part of another.

Background. This is the last of the techniques by which children reproduce groups of specified size in the *Primer*. It is a combination of two techniques already used,—increasing the size of a sub-group and selecting part of a larger group.

In each exercise on the *Primer* page, the size of the group to be reproduced is indicated by the figure in the upper left-hand corner of the box. The group of required size is formed by drawing a ring around all objects in the left-hand sub-group and as many more as are needed from the right-hand sub-group.

In these exercises it is advantageous if the child can identify the size of each left-hand sub-group quickly. This is facilitated by recognition of the standard pattern whenever 3 or 4 appears in the left-hand sub-group. However, the child does *not* need to know the size of the right-hand group. This fact should be made clear to him so that he does not go to the unnecessary extreme of determining the size of the right-hand group. Since the size of a right-hand group need not be identified, these groups are not necessarily shown in standard patterns.

Pre-book Lesson

1. Have a demonstration-size flannel board on hand, with 10 small cutout circles: 4 of them of one color (for example, red) and 6 of them of another color (for example, green). Also have cutout numerals 1, 2, 3, 4, 5. (If these are not available, numerals may be written on the chalkboard.)

15

3 	5 	4
2 	4 	5
5 	3 	4
5 	4 	3
5 	4 	5

On the flannel board set up the patterned arrangement the first box on the *Primer* page using the circles in place of oral. Put a cutout 3 in the upper left-hand corner of the flannel board (or write 3 on the chalkboard). Use two circles of one color (red, for the left-hand sub-group and five circles of another color (green) for the right-hand group. Have the children identify the size of the left-hand sub-group and then move as many green circles as needed (1) to be with the 2 red circles to form the group of 3.

2. Following a similar procedure, use other arrangements similar to those in the *Primer*. Do not merely duplicate these in order, however. Use as many illustrations as seem necessary for the children to grasp the idea involved.

3. Modify the above procedure in other exercises in the following way. Do not move circles from the right-hand group to the left-hand sub-group. Instead, have a child "outline" or "frame" with his two hands the way in which he would form the total group from the left- and right-hand groups. Or, have him draw an imaginary ring around the groupings to be combined after he has "framed" each one.

Book Lesson

1. Reproduce the first exercise on the chalkboard. Have the children make the necessary identifications and have one child draw a ring to form the group of 3. Compare his work with that found in the first box on the *Primer* page.

2. Deal with the next exercise directly in the *Primer*. Have the children make the necessary identifications and then verify and trace the dashed line started by Cappy. Have all children work the last exercise in this row under your direct supervision and check the work of each.

3. Encourage the children to work independently on the rest of the exercises. You will need to supervise the work carefully and be very alert to the need for assistance on the part of some pupils.

Differentiations and Extensions

1. Provide special help for *slower learners* who may be having difficulty with this work by setting up work-text exercises on the flannel board and dramatizing them there.

2. As you have opportunity to do so, check to see if *more capable pupils* have reached the point where they can recognize immediately how many they must include from the right-hand group in each exercise.

NOTES

Teacher's Preparation. Have at least a nickel and 7 cents (coins) available. You can make a chart to which you fasten (with scotch tape) a nickel and a cent. Label the nickel as 5¢ and the cent as 1¢, so the children will grow familiar with the ¢ sign.

1. Hold up a nickel and a cent and have them named by children who know them.

2. Ask how many cents equal a nickel. When you have secured the correct answer, lay a nickel on the table, and also 2 cents. Ask if the cents will buy as much as the nickel. Then have some child increase the 2 cents by adding others until there are enough cents (5) to be equal in value to the nickel.

3. Lay a nickel and a group of 7 cents side by side. Ask which will buy more. Then have a child remove enough of the 7 cents so that the total left (5) is equal in value to the nickel.

1. Explain the symbol \mathcal{E} as it occurs in the dictionary at the top of the page. Discuss the five boxes with the children, bringing out the implied relationships. Emphasize that the numeral each time (as in $4\mathcal{E}$) tells *how many* or *how much*, and that the \mathcal{E} symbol tells *what*; that is, cents. Direct special attention to the fact that cents equal to $5\mathcal{E}$ may appear in two forms: as 5 cents or as 1 nickel.

2. In the four boxes at the bottom of the page, explain that in each box the children are to select which of three things can be bought for the coin(s) shown. Use the first box as an example, calling attention to the fact that Cappy is showing which piece of candy can be bought with the 1 cent. Direct the children to help Cappy finish drawing the ring around the piece of candy marked "1¢."

3. Permit the children to work independently on the three remaining exercises, but circulate among the children to offer assistance where needed.

Differentiations and Extensions. Play a “store” game. Secure 5 objects and attach price tags of 1¢, 2¢, . . . 5¢ to them. Select one child to be the storekeeper. The other children will take turns being customers. Give a customer 1, 2, 3, 4, or 5 cents or a nickel in real or “play” money. Have him select which of the 5 objects he can purchase. Vary the objects or switch the price tags from time to time.



Pupil's Objective. To study further the relationship between the values of the cent and the nickel (*a*) by increasing a group too small; and (*b*) by selecting from a group too large.

Pre-book Lesson. Activities 2 and 3 of the Pre-book Lesson for the preceding *Primer* page (16) should be adequate preliminary experience for the work of this page. If not, further experiences of a similar nature can be provided.

Book Lesson

1. Encourage the children to explain what Cappy is doing in the first exercise at the top of the page. Be certain they understand that Cappy is drawing enough more cents so that there will be 5 cents in all—the number needed to have the same value as the nickel at the left of the gray line in the box. Ask the children to help Cappy finish his drawing. Emphasize that it is sufficient to draw only a circle (ring) to represent a cent. Have the children complete the other three exercises in the top half of the page independently.

2. In the lower half of the page, use the first exercise to show that there are too many cents—more than are needed to equal a nickel. Cappy is drawing a ring around just 5 of them—just enough of them to be of the same value as the nickel. Have the children help Cappy finish his work, then have them do the remaining two exercises independently. Check carefully the last exercise, in which all the given cents must be encircled. Discuss this with the children as needed.

LOOKING AHEAD

Have Looking-Ahead experiences at this time to provide oral manipulative work in introducing the dime and developing its relation to the cent and the nickel as preparation for written experiences on *Primer* pages 52 and 53.

1. Provide each child with 10 cents (coins) and 2 nickels—or good representative “play” coins. Review the name of each coin, the fact that 1 nickel = 5 cents, and some of the things that could be bought with each coin.

2. Tell each child that you are now going to give him a new coin and that you wonder who can tell you what it is. Give a real or “play” dime to each child. If “play” dimes are used, be sure to have a few real dimes on hand for the children to see. After each child has his new coin, solicit its name—*dime*.

3. Ask the children whether or not a dime is worth more or less than a cent, and whether it is worth more or less than a nickel. Emphasize that even though it is smaller in size than each of these, it is worth more.

4. Establish the exact relationship of the dime to each of the other coins, making clear that 1 dime = 10 cents and 1 dime = 2 nickels. Have the children verify the latter fact from the first fact by replacing each of the two groups of 5 cents with a nickel. Also ask if a dime could be as much as 1 nickel and some cents. Lead to the fact that 1 dime = 1 nickel and 5 cents.

5. Talk with the children about things that can be bought for a dime.

NOTES

17



Teaching Primer Page 18

Pupil's Objectives: (a) To learn the number words *one* and *two*; and (b) to learn to write the figures 1 and 2.

New Words: *one, two*

Background. Read again on *Teachers' Edition* page 43 the statement in objective 6 concerning the writing of figures.

Study the *Primer* page to note the kinds of help given. In the first row of practice for each figure, the children merely trace the completed figures. In the second, they write over the dashed figures made by Cappy. In the third they make the figures starting each time at the guiding blue dot and continuing in the direction indicated by the black arrow (shown in the first two boxes). In the last row they write the figures independently of help, save for the blue guide lines and the models above.

Pre-book Lesson. Demonstrate the writing of these two figures. First, place on the board the same kind of guiding lines, dots, and arrows as appear in the exercises on *Primer* page 18. As you write, describe what you are doing.

1. For 1: We really make a straight line, and that is all. We start here at the blue dot at the top and go to here on the blue guide line at the bottom. When we are through, does the figure look like the 1's you have seen in the book?

Put several starting dots with guide lines on the chalkboard and let several children go to the board to make the numeral.

2. For 2: We start here at this blue dot; then we go up a little like this, then come down in a long line like this, then over to here.

3. Make sure that the children can read the number words *one* and *two*, the first of the few reading words in the entire *Primer*. The only number words to be used in the *Primer* are introduced and repeatedly presented each time in connection with writing the figures for 1 to 5.

Book Lesson

1. In connection with the 1 animal or the 2 animals pictured at the left of the page, review the number words *one* and *two*.

2. While the children are at work on the rows of practice for the figure 1, move about the room and note common difficulties or errors. Stop the work before beginning with the figure 2, and explain at the board just what is wrong with some of the figures you have seen. Better yet, reproduce the incorrect work on the board and ask for criticisms and suggestions, which should be followed then by helpful demonstrations. Ask why the correct figures are good.

3. Since the figure 2 is more difficult to make than the figure 1, you will need to give much more assistance, both with the class as a whole and with individual children. Do not, however, expect anything like perfect figures at this time. Practice will bring improvement.

4. In the last row of exercises, the children are to write the figures for the numbers of "quarter moons" shown and for the number words *one* and *two* appearing above the empty boxes.





















































Differentiations and Extensions

1. For *slower learners* mimeograph exercises like those at the bottom of the page for practice and/or seatwork. You may want to show the guide lines on the mimeographed practice pages.

2. As a check on the skill of the *more capable pupils*, have them write the figures 1 and 2 on regular manuscript writing paper.

3. *All children* can make cards for 1 and 2 with their own simple drawings and the correct figure under each drawing. These cards can be displayed.

NOTES

18					
 one					
 one					
 one					
 one					
  two	2	2	2	2	2
  two					
  two					
  two					
    	two	one			



Pupil's Objectives: (a) To learn the number word *three*; (b) to learn to write the figure 3; and (c) to get more practice in reproducing groups to and including 5, when given the numerals.

New Word: *three*

Background. The figure 3 is difficult to make. Despite the help and the practice given on this page, your pupils will still make imperfect representations. Continued practice under guidance will bring improvement.

Study the exercises calling for reproduction at the bottom of the page. Note that there are two types: (1) reduction of a group too large (first row) and (2) increasing a group too small (second row).

Pre-book Lesson. Similar to that for teaching *Primer* page 18.

Book Lesson

1. In connection with the pieces of fruit pictured at the left side of the page, make sure that the children can read the number word *three* and the figure 3 which they will learn to write.

2. To teach the writing of 3, follow the suggestions for teaching the writing of 1 and 2 on page 18 of the *Primer*. Remind the children of the significance of the blue starting dot and of the arrow.

After pupils have worked through the four rows of practice at the top of the page, assign the exercises at the middle, which put to work the new skill in the identification of patterned groups as large as 3 and of the number words *one*, *two*, and *three*.

3. For the maintenance exercises in each of the last two rows, give only minimum help. See first if the children themselves can tell what is to be done.

Differentiations and Extensions













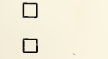
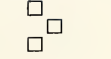
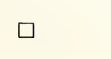
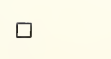
1. Provide practice like that at the top of the page for your *slower learners*. When all are able to make recognizable 3's, assign seatwork modeled after the row of exercises at the middle of the page. Of course you need not restrict the objects in the groups to those which are representative in form. You may prefer to use drawings of real objects as being more interesting.

2. As a check on the skill of the *more capable pupils*, have them write on regular manuscript writing paper the figures 1, 2, and 3.

3. *All children* can add to their sets of simple drawings with correct figures under them by making a drawing for a group of 3.

NOTES

19

 three	3	3	3	3	3
 three	3	3	3	3	3
 three					
 three					
				one	three
5	2	4	3		
					
4	5	3	2		
					

Pupil's Objective. To learn the position of each numeral in the series from 1 to 5.

Background. Note that up to this time, attention has been centered, not on the serial order of the numbers, but on their meaning and the use of the separate numerals. Page 21 of the *Primer* provides additional experiences relating to the serial order of the numerals.

Teacher's Preparation. Have available the *Picture Number Cards*.

Pre-book Lesson

1. Give each of 5 children one of the *Picture Number Cards*, and arrange the children in irregular order in front of the class so that, as the numerals on their cards are held up for all to see, they may read from the left 2, 5, 3, 1, 4. Under directions from the class, have the children exchange places so that the cards will read from the left 1, 2, 3, 4, 5.
2. Repeat several times with the cards exposed in differing irregular order. Use the entire class.

Book Lesson

1. Ask: **What do you think we must do in the picture of the cars at the top of the page?** Lead the children to suggest that the car between car 1 and car 3 has no numeral on it, and that it should be car number 2. Call attention to the numerals 2, 3, 4 above this car. Have the children trace over what Cappy has drawn, making a ring around the correct numeral—2—and then drawing the line from the numeral to the car.

2. Ask the children to tell what is to be done for the last car in the line—that is, encircle the 5 and draw a line from the 5 to the last car. See that all children do this correctly.

3. Permit the children to try to work independently on the next two rows: the horses and the turtles. Have the children stop after they have finished these two rows. Check their attempts and have corrections made as needed.

4. The boxes at the left in the lower half of the page show incomplete numeral series. In the first three boxes, the third numeral in each series is to be indicated. In the last three boxes, the next numeral (that is, the numeral after the given one) is to be indicated. Have the children look at the first series: 3, 4, —. Ask them: **Which numeral should come next, after 3 and 4? Would it be 2 or 5?** When the correct response has been given, pupils will trace over the ring around 5 to show that this is the numeral to go in the empty box. Have the children finish the other series independently, but circulate among the class to detect errors and correct them.

5. Now direct attention to the picture of the girl and her hopscotch game. Have the children note the position of the stone—in block 5. Say: **Janet must start at block 1 and hop to each block in order until she reaches her stone. Draw lines to show how she will jump. The first line has been started for you. Trace over it and then draw the other lines. Be sure to have Janet hop in the blocks in the right order.**

Differentiations and Extensions

1. Give a set of *Picture Number Cards* to each of your helpers. Have the helpers arrange them numeral side out on the chalk tray, in irregular order, for *slower learners* to rearrange and put in proper sequence. Suggest that the helpers repeat this procedure using various irregular arrangements of cards until their partners are able to arrange the numerals correctly without hesitation.
2. Games for *all children* calling for the correct serial order of the numerals can be organized for enjoyable practice. *Hopscotch*

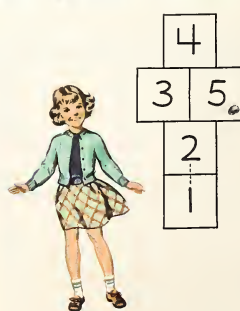
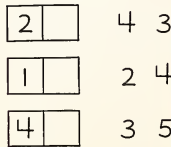
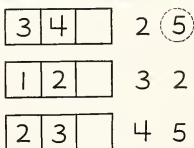
serves as a good example. Sketch on the floor or on the playground an outline like the one on *Primer* page 20, numbering each block from 1 to 5. (Later the number of blocks and numerals can be increased.) Have children hop on one leg from one block to another in order from 1 to 5. The pattern of blocks and the order of numbering should be varied for diversified practice. If pupils have trouble hopping on one leg to all five squares in the order shown, you can exchange the positions of the 4 and the 5 so pupils can land on both feet in squares 3 and 4. Variations of this game may be made by tossing bean bags into boxes in succession.

The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Connecto*; *Cross the River* (1) and (2); *Hooked* (1); *Out of Order* (1) and (2).

3. Work sheets similar to either part of the lower half of *Primer* page 20 can be prepared and duplicated for additional practice as needed. The *more capable children* might prepare such sheets for you.

4. Return to this page after the children have learned to write all the numerals through 5 (that is, after completing *Primer* page 38). Then, instead of the lines and rings which the children drew before to show the numeral sequence, have the children actually write the missing numeral in each instance.

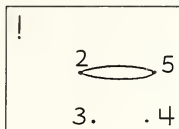
20



Pupil's Objective. To continue study of the place of the numerals 1 to 5 in their serial order.

Pre-book Lesson

Draw on the board an incomplete outline of an object with five numbered dots (1 to 5) which indicate points to be connected to finish the picture. The sketch of a pan at the right is illustrative. Let children who have had experience with such "surprise pictures" show how to connect the numerals. *Be certain to emphasize that the dots are to be connected in the correct order, beginning with 1 and ending with 5.*



Book Lesson

1. Give such help as needed with the first exercise, the Indian tepee. Then allow children to finish independently the other three sketches in the upper half of the page,—the wagon, the tree, and the house. Be certain to check that the dots are being connected in the proper serial order. Have the children stop after they have finished the house.

2. Have the children refer to the picture of the boy in the lower left corner. Ask: **What do you think he is doing?** (Building a block tower.) **Cappy has already put a ring around the next block to put on the tower, and has drawn a line to show where it will go.** You help Cappy by tracing the ring and the line. Be certain that the children understand that the line

is to go from the circle around the 3 block to the top of the 2 block on the pile.

3. For the next exercise say: **Look at the next box. Suppose you wanted to put another block on top of the tower of 3 blocks. Which would it be? ... That's right, the 4 block. So, draw a ring around the 4 block, and then draw a line from the 4 block to the top of the 3 block—to show where it will go on the block pile.**

4. **Do you see what you are to do with the other three block towers?** Allow children who understand to work by themselves. Give your attention to those who may not seem certain of what to do.

5. When the work for the page as a whole has been completed, check with the children on the work for the last three exercises.

Differentiations and Extensions

1. Exercises similar either to the top half of *Primer* page 21 or the bottom half of the page can be prepared and duplicated for use with children needing additional practice. *Slower learners* who have difficulty with the block towers may be helped by returning to actual manipulation of numbered blocks.

2. If you do mimeograph exercises similar to those at the top half of the page, have *more capable pupils* try to start at 5 and work backward to 1.

Reminder. Can your pupils count by rote to 20?

LOOKING AHEAD

This page allows for another occurrence of Looking-Ahead activities which will extend the oral and manipulative experiences with ordinal concepts to include *fourth* and *fifth*. The sections below provide oral, manipulative experiences with the ordinal concepts of *first, second, third, fourth, fifth*.

1. Have five children stand in line at the front of the group you are working with. Moving from left to right, have each child identified by name (Billy, Jane, Jack, and so on). Then tell the children that there are number names we could use to tell which of the children we are talking about. Again beginning at the left, ask what number name we might use with each child. Solicit the answers of *first, second, third, fourth, fifth*.

2. Now have five other children replace the ones used previously. Ask: **Who is first? Who is second? Who is third? Who is fourth? Who is fifth?**

3. Ask similar questions with 5 other children, but not in sequential order; that is, ask: **Who is second? Who is fifth? Who is third?** and so on. Repeat with other children, asking the questions in a different order.

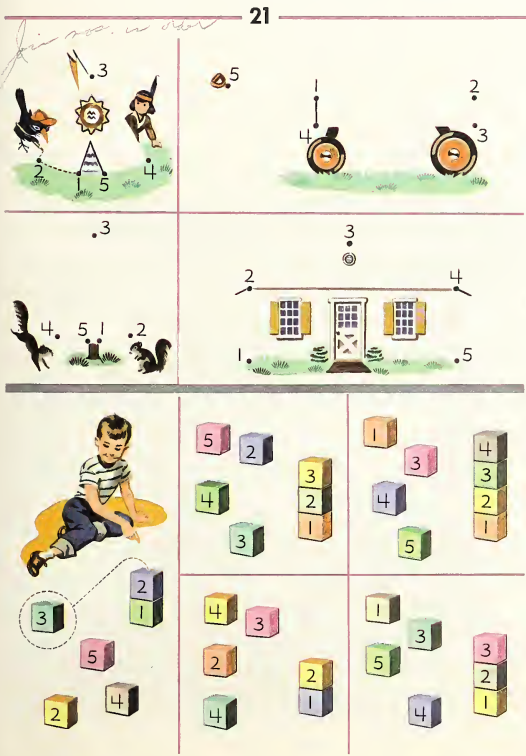
4. Have five children at the front of the room. Ask someone to give a book to the second child. Ask someone else to give a pencil to the fourth child, an eraser to the third child and a ruler to the first child. Then ask which child was given nothing.

5. Repeat with five other children.

6. Now have six children at the front of the group. Ask someone to give an object to the second child, someone to give a different object to the third child, someone else to give another different object to the first child, to the fourth child, and to the fifth child. Repeat using six other children and different objects, asking the questions in a varying order.

7. Now put five blocks on a table (in a line). Ask one child to point to the second block. Ask another child to point to the fourth block. Ask other children to point to the third block, the first block, the fifth block.

8. Provide a similar experience using six books or other objects.





Pupil's Objectives: (a) To study the number 6 more intensively; (b) to learn to read the numeral 6; and (c) to learn that the group of 6 is one larger than the group of 5.

Background. It has been assumed that up to this point your pupils will have acquired ideas of the numbers 1 to 5 adequate for identifying groups and reproducing them to the limit of 5 in the *Primer* exercises. Beginning with 6, we provide experiences separately for each successive number to 10, one at a time, and at the same time teach the corresponding numerals. Study *Primer* pages 22, 23, 24, and 25 to note the pattern of careful development for 6 because this is also the basic pattern for 7, for 8, for 9, and for 10. Page 22 provides oral exploratory work with 6 in a social context. Page 23 has simple isolated picture and pattern experiences for the first written identification work involving 6. Page 24 goes a step further in the written experiences by requiring the pupils to work in the more complicated social setting. Page 25 provides a variety of reproduction experiences. Thus the work on these four *Primer* pages plus the comparison experiences suggested in the *Teachers' Edition* give a thorough introduction to the meaning and use of 6.

Teacher's Preparation. Have ready the materials for 6 to add to the class *Number Dictionary Chart* (picture, numeral, and number word).

Prepare or have your *more capable children* prepare cards for 6 for your several sets of *Picture Number Cards* and *Pattern Number Cards* to be used in practice with the newly learned number.

Pre-book Lesson. As you and your pupils build the 6-group into the class *Number Dictionary Chart*, have pupils relate the new group to the 5-group, sensing that it is one more.

Book Lesson

1. Refer to the number dictionary at the top of the pupil's page. Say: **Count the number of roses in the bowl. . . . What is that little figure in the corner (6)? . . . Why is it there? What does it tell us? Cover one of the roses. How many roses do you see now? Six is how many more than five? Next: In the next little picture (the triangles) do you see the same figure? What does it mean? . . . What does it tell us? . . . Are there really that many little triangles in the picture? . . . Count and see. Next, Here is the little figure again, but there is no picture. So, you can draw one. Put as many balls (or what not) in your picture as the figure tells you you should have. Put them in the same pattern as the triangles, 3 across the top row, 2 across the next row, and 1 at the bottom.**

2. Study with your children the large garden picture, first relating it to the children's own experiences. (The picture is intended to provide a social setting for the lesson, to show that 6, and other numbers, are normal occurrences in life.) Be sure that your children know the names of all the objects and that they recognize the fact that these objects are in groups. Then ask "how many" questions about the large picture, such as, **How many big bushes do you see? and How many large concrete slabs are there?** until all groups of objects in the picture have been identified quantitatively.

3. Numerals in serial order at the bottom of the page allow for experiences in bringing 6 into the series.

Differentiations and Extensions

1. For *all pupils* organize flash-card practice (and don't forget the work with serial order) with the large *Picture Number Cards* and *Pattern Number Cards*, this time including the cards for 6.

2. For *slower learners* use helpers from among your *more capable children* to whom you have given sets of individual *Number Cards*, including 6.

3. The following games, selected from *Teachers' Edition* pages 15-25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

4. Your *more capable children* may wish to make *exact* comparisons of the following kinds involving the 6-group, using the *Number Dictionary Chart*:

6 is two more than 4;
6 is three more than 3; etc.

Reminder. Are you checking on ability to enumerate and identify groups to 20?

NOTES

22



1 2 3 4 5 6

Pupil's Objectives: (a) To practice identifying groups to and including 6, using the number symbols; and (b) to compare the relative sizes of groups through 6 when they appear in isolation.




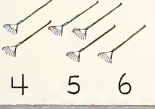
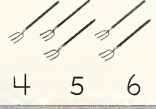

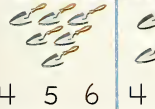

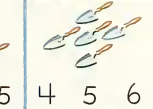


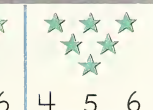

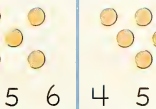



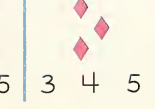
Pre-book Lesson

- Using the *Pattern Number Cards* (including the pattern for 6), give some work on identification of patterns for groups to 6.
- In case your pupils may need a little reminding, give some practice on the chalkboard of the type on *Primer* page 23. Use pictures of real objects and representative items in pattern arrangement.

Book Lesson

- What do you think we are to do with the picture showing the hoes? Cappy has been helping you. (Find out how many there are and then circle the correct figure.) . . . How many hoes are there? . . . Which of the figures did Cappy circle? . . . All right; now make heavier the ring around 6 that Cappy has started for you.
- If it is needed, give help to the class as a whole with one or two more exercises. Then have the *more capable children* finish the page independently. You will thus have time to work with individuals or with small groups of children for whom the task on this page is too difficult.
- When all have completed the page, check the work orally with the class for accuracy.

23

 4 5 6	 4 5 6	 4 5 6
 4 5 6	 4 5 6	 4 5 6
 4 5 6	 4 5 6	 3 4 5
 4 5 6	 4 5 6	 4 5 6
 4 5 6	 4 5 6	 4 5 6
 4 5 6	 4 5 6	 3 4 5

4. Call attention to the use of the new pattern (for 6) in certain of the exercises in the last three rows.

5. Make use of this page for oral maintenance experiences in comparison of the sizes of groups.

a. Look at the pictures of the garden tools in the first two rows at the top of the page.

Are there more wheelbarrows than shovels? (Point to them.) Which are fewer,—hoes or pitchforks? (Point to them.)

b. Now look at the row of trowels (3d row).

Are there more trowels in the first box than in the last box in this row?

Are there just as many trowels in any other box as there are in the first box?

Which box has the fewest trowels?

c. Now look at the row of stars.

Are there more stars in the first box than in the last box in this row?

Are there more stars in any other box than there are in the first box?

In which box are there the least stars?

Differentiations and Extensions

1. For *slower learners* who need further comparison experiences, use the last two rows on *Primer* page 23 as follows:

a. Now look at the row of dots.

Does the first box have the most dots or the least dots?

Which boxes have more dots than the last box?

b. Ask similar kinds of questions about the groups of diamonds in the last row.

2. Have *all pupils* identify various groups on *Primer* page 23 that are *one more* than the specific groups you indicate there. Have *more capable children* identify various groups that are *two more* or *three more* than specific groups you indicate.

3. The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

NOTES

Pupil's Objectives: (a) To develop the ability of independent identification of the 6-group and smaller groups as they appear in functional settings rather than in isolated ones, indicating the size of each group by circling the written figure; and (b) to learn to compare the sizes of groups through 6 when they appear in functional settings.

Background. The nature of the activity is not unfamiliar to the child. He has done this before on *Primer* page 10. (He also will do the same thing later on *Primer* pages 32, 36, 42, and 46.)

Pre-book Lesson. You may wish to refer the children back to *Primer* page 10 before working with this page. If you do so, remind them that the single picture in each box is a clue to the group to count.

Book Lesson

1. Discuss the functional picture with the children. Identify the various things shown in the picture. Give the children opportunity to talk about a similar scene within their own experience.

2. Work the first exercise below the picture together with the children for illustrative purposes. Have the children tell how many dog-food cans they see in the big picture. Then have them circle the numeral which tells how many.

3. Have the children work the remaining exercises independently, but first be certain that each child understands what to find in each instance:

- the number of birdhouses
- the number of birds
- the number of roses
- the number of dog-food dishes
- the number of flagstones
- the number of dogs
- the number of hollyhock bushes (not individual flowers)

Circulate among the children, giving appropriate help as needed.

4. Make use of this page for oral maintenance experiences in comparison of the sizes of objects and groups.

Look at the big picture at the top of the *Primer* page.

Which is the tallest plant?

Are there more puppies in the basket than out of the basket?

Are there fewer birds than puppies?

Are there as many puppy dishes as there are puppies?

Is there a stone for each puppy to sit on?

Are there fewer dog-food cans than puppy dishes?


Differentiations and Extensions









1. For *slower learners* who need further experience with group comparisons in functional settings, go back to the picture on *Primer* page 22 and ask questions similar to those about the picture on *Primer* page 24.

2. Have *all pupils* make various group comparisons (through groups of 6) as they appear in the functional classroom setting.

3. Have your *more capable children* make *exact* comparisons with groups in functional settings.

24



	1 2 3 4 5		1 2 3 4 5
	1 2 3 4 5		2 3 4 5 6
	2 3 4 5 6		2 3 4 5 6
	2 3 4 5 6		2 3 4 5 6

Pupil's Objective. To reproduce groups of as many as 6: (a) by drawing the whole group; (b) by completing groups that have been started; (c) by selecting from groups too large; and (d) by combining all of one group with part of another.

Background. This is the last page of the sequence devoted to 6. The four pages make up a unit in two different senses—(1) the unit is built around the number and the numeral; and (2) there is a social setting—the gardening. Do not fail to point out that numbers have their place in a social setting or activity.

Book Lesson

1. Rake exercises: **Who thinks he knows what to do with all the rake pictures? . . . What does the big figure 6 in the middle tell us to do?** Try to elicit that each space, when the work has been done, is to show six rakes. (If pupils do not volunteer this information, tell them.) Then ask: **What must we do with the box where Cappy has drawn in 1 rake? How many rakes are needed there? . . . To have six rakes in each of the other boxes, what must we do?** As soon as the children are capable of working alone, have them proceed. Inspect their work, and help the *slower learners* who are in trouble.

2. Seed pictures: In this row, groups of indicated sizes are to be selected from larger groups. To the extent possible, have the children tell what is to be done and how to do it. Help with the first exercise, where Cappy is working, should be enough.

3. Pictures of dots: Here, beginning with the left group whose pattern they should recognize, the children take enough more

from the second group to get the group required. Proceed as in the exercises above.

Differentiations and Extensions

1. For the *slower learners* provide mimeographed sheets of exercises of the types shown on the *Primer* page. Keep these types in separate sections as on *Primer* page 25. (Note that there are several kinds of activity.)

2. For the *more capable children*, provide mimeographed sheets on which all the types of reproduction are mixed.

3. Have *all children* show that they can reproduce numbers by tapping pencils on the desk.

LOOKING AHEAD

Pattern the development for rote counting and enumerating through 30 after the previous suggestions for working with rote and rational counting through 20 (on *Teaching Primer* Page 13).

1. Beginning with 20 as two groups of 10, keep putting 1 more with the group as the number names for 21 through 30 are established. Again, do not develop the tens-and-ones concept as such, but let the grouping of objects suggest this idea which will be developed systematically in *Book One*.

2. Help children to see how the number names for 21 to 30 are related to those in the first and second decades. Recognition of this pattern of number names will be increasingly helpful to children as they learn the counting series through 30.

3. Provide various counting experiences that will enable the children to apply their counting ability in a rational way to find how many in a group.

4. Ask the children to tell what numeral comes after a specified one.

5. Ask the children to begin with a specified numeral and count to an indicated point: for example, begin with 18 and count to 25.

NOTES

25

6 	5 	6 	4
6 	6 	5 	6

Pupil's Objectives: (a) To show a knowledge of the place in the serial order of the numerals 1 to 6; and (b) to test abilities learned up to now in the *Primer*.














NOTES

Book Lesson

1. Previous experiences (*Primer* pages 20 and 21) should make your pupils understand what to do in the first two rows (serial order of the numerals). Give only as much help as needed, trying first to get the children themselves to explain what is to be done. In the two boxes across the top of the page children draw a line from the correct figure in the upper row to the correct circle to complete the series of numerals from 1 to 6. In the three sets of exercises in the second row, pupils circle the figure which completes the series of numerals given.

2. The bottom of the page is a test on ideas and skills taught in this Second Period of Instruction. Again give but a minimum of help as the children (a) reproduce the required groups of quarter moons, (b) combine all of a recognized group with part of another group of squares, and (c) write the numeral to stand for a patterned group of triangles or for a number word.

Differentiations and Extensions. Examine the children's papers to discover points of individual and common difficulty where remedial instruction will be necessary. A chart somewhat like that suggested for the inventory pages (*Teachers' Edition* page 44) may help you to get an overall picture of the status of your class. You may want to use these headings: sequence; identification; reproduction; writing numerals; recognizing number words; recognizing patterns.

26																	
																	
⑤ ② ③ ④ ② ⑥ ③ ① ② ○ ④ ○ ⑥ ① ○ ③ ○ ⑤ ○																	
<div>3 4</div> <div>2 3</div> <div>4 5</div>			<div>5 6</div> <div>5 4</div> <div>3 6</div>			<div>4</div> <div>2</div> <div>5</div>			<div>3 5</div> <div>3 1</div> <div>4 6</div>			<div>3</div> <div>1</div> <div>5</div>			<div>4 5</div> <div>3 2</div> <div>6 3</div>		
<div>5</div> 			<div>3</div> 			<div>6</div> 			<div>4</div> 								
<div>6</div> 			<div>4</div> 			<div>3</div> 			<div>5</div> 								
								two		one		three					

Discussion of the Third Period of Instruction

Arithmetic Objectives for the Third Period of Systematic Instruction

- (1) Increase in ability to use understandingly words for comparison of sizes and many quantitative terms other than numerals*
- (2) Ability to read the numerals to 10 (and the number words to five) and to understand the place of each numeral in the series
- (3) Ability to count by rote to 50 and to enumerate (for both identification and reproduction)
 - (a) orally with concrete materials to 50*
 - (b) in association with written numerals to 10
- (4) Extended understanding of the numbers to 10 through comparison of the sizes of groups and immediate recognition of patterned groups
- (5) Ability to use ordinals
 - (a) orally through *tenth**
 - (b) with written experiences through *fifth*
- (6) Ability to write the figures 4 and 5
- (7) Written experiences in connection with the dime, the symbol ¢, and the relation of the dime, the nickel, and the cent
- (8) Ability to deal with time on the hour (both identification and reproduction)
 - (a) orally to 12 o'clock*
 - (b) in association with written experiences to 10 o'clock
- (9) Oral experiences with measuring instruments*
- (10) Oral manipulative experiences with component parts of the numbers to 5 as introductory to the more specific number combinations in addition and subtraction*
- (11) Oral manipulative experiences in discovering addition and subtraction facts with sums and minuends through 5; with some emphasis on generalizing when the sum is one more or one less*
- (12) Oral manipulative experiences in identifying $\frac{1}{2}$ of an object*
- (13) Ability to deal with simple problem situations by using real and representative objects*
- (14) The disposition to use, and the habit of using, number in practical ways*
- (15) The possession of desirable emotionalized responses with respect to arithmetic—attitudes, appreciations, and values*

Discussion of the Objectives

With regard to *Objective 1*, little more need be said (see *Teachers' Edition* page 32). As occasions are presented for the use of comparison and quantitative terms from the following list, take full advantage of opportunities to teach exactness of meaning:

Oral Vocabulary List for Third Instructional Period

Daggers indicate words that definitely will be needed in the following period of instruction.

†bushel	far	†measure
	†fast	minute
†cold	†foot	
†cool	†full	near
deep	†halves	†one half
dollar	†heavy	
		pair
†empty	†light	†part
	†long	†pound

*These objectives are developed orally only, because either the *Primer* pages do not lend themselves to the learning in question or the material serves as readiness for written experiences to come later in the program.

†quart	†size	†warm
quarter	†slow	†weigh
		†whole
		wide
†ruler	†temperature	
	†thermometer	
†scales	thick	†yard
†share	thin	†yardstick
†short		

Objective 2. This is an extension of the objective of the second period of instruction which called for reading the numerals to 6 (and the number words to *three*), as well as a knowledge of the place of each numeral in the series (see *Teachers' Edition* page 42). The written experiences in the *Primer* for this third period of instruction deal with the numerals to 10, their serial order, and the number words through *five*. The ability to read each new numeral is immediately put to work in the *Primer* exercises.

Objective 3 calls for the extension to 50 of the ability to count by rote (see *Teachers' Edition* page 43). For such children as have not by themselves gone on from 30 to 50, rely largely upon pupil helpers to do the teaching.

This objective also specifies certain oral identification and reproduction requirements. Your pupils will need practice in applying their skill in enumeration of large groups of real and representative objects—this time to totals as high as 50. Having learned in the two preceding periods just what enumeration is and does, pupils should encounter little difficulty save, of course, that the larger the group of objects, the easier it is to miss objects or to enumerate objects twice. Occasional experiences in enumerating large groups under the direction of helpers should enable all pupils to achieve the outcome.

Written experiences will require identifying groups as large as 10 and reproducing groups of a specified size up to 10, enlarging groups which are too small and reducing groups which are too large. These written experiences will be taken care of in *Primer* lessons.

Objective 4 requires the development of the ability to compare sizes of groups to 10 and to recognize at a glance regularly patterned groups of 7, 8, 9, and 10. (Read again the material on *Teachers' Edition* pages 38–39.) The new patterns are taught in connection with the material on each of these four numbers. Skill in recognition can be strengthened by group and individual practice with the appropriate cards previously described.

Objective 5. The oral experiences in work with ordinals in the first two periods of instruction (see *Teachers' Edition* pages 39 and 43) will now crystallize in written experiences in the *Primer* in connection with these numerals of position to *fifth*.

Your pupils now should be fairly well acquainted with the ordinal series through *fifth*. They are, therefore, accustomed, in the case of *fourth* and *fifth*, to the method of changing cardinal number words to ordinals by using *-th* as the ending. Probably there will already have been some oral need for the ordinals to *tenth*, so that many of your pupils will have learned them. In preparation for oral experiences to extend this objective to a knowledge of ordinals through *tenth*, suggestions will be made from time to time for Looking-Ahead activities in this area.

Objective 6 needs no explanation. Your pupils will work toward acquiring the ability to write the figures 4 and 5 as they have already learned to write 1, 2, and 3.

Objective 7. Your pupils probably can easily recognize the dime because of the oral experiences previously specified. (See Teaching Primer Page 17.) Now they will study its value as compared with that of the nickel and the cent, and then make use of number relationships already learned in examining further the equivalence of two nickels to the dime or of one nickel and five pennies to the dime.

Objective 8. In this period we ask children to deal with time on the even hour only. Since the pupils have had written experiences with numbers to 10 only, the *Primer* written experiences in connection with the clock are carried through 10 o'clock only. However, oral experiences should carry the teaching through 11 o'clock and 12 o'clock.

Objective 9. Measurement can be approached in several ways. For children in Grade 1, exact measurement is not easy. We prefer to begin the study with oral experiences in identifying common measuring instruments (the cup, the thermometer, scales) and recognizing the situations in which they are used.

Objective 10. During this period the experiences in connection with component parts of numbers are to be with manipulative materials entirely. In developing the component idea of numbers (to 5 only), it will be easy to help pupils find that a group of 2 (real or representative objects) is made up of 1 and 1; that a group of 5 may be made up of 1 and 4 or 2 and 3 and so on.

Objective 11. After your pupils have experimented with manipulative materials and discovered the components of a group, you can let them have oral experiences with materials in putting together parts of a group to make a total (to 5) and also in taking away part of a group (to 5) to find how many are left. These oral experiences are in preparation for the written experiences which will come in the next teaching period. In preparation for written work to come later in the program, oral experiences are provided for generalizing about *one more* and *one less*.

Objective 12. Again, as preparation for the *Primer* written experiences which will come in the next teaching period, you will want to take some time during this teaching period to see whether your pupils can identify halves of real objects.

Objective 13 is listed for attainment in each period. Take a few minutes now and then to have children act out number problems with real objects or by using substitute representative objects. These may be incidental problems which occur during the day or they may be artificial problems like those following. Note that these new problems, unlike those on *Teachers' Edition* page 40 preceding, involve totals of 5 and 6.

Put-together Problems

1. Sam had 4 red crayons and 1 yellow crayon. How many crayons did he have in all?
2. George had 1 marble. Henry gave him 4 more. Then how many marbles did George have?
3. Four children were drawing at the chalkboard. The teacher told Mary to go to the chalkboard, too. Then there were how many children at the chalkboard?
4. At the store Patty bought a big crayon for 4 cents and a pencil for 1 cent. How many cents did she spend there?
5. Nancy cut out 3 paper dolls from one book and 2 from another. How many paper dolls did she cut out?
6. Fred was watching birds pick up crumbs from the ground. He saw 2 birds come, then 3 more. How many birds did Fred see?
7. Joe spent 3 cents for one pencil and 2 cents for another. How many cents did the two pencils cost?
8. Jean is making a picture book for her little sister. She has put 3 pictures on one page and 2 pictures on the next page. How many pictures has she put on those pages?

9. Ned was collecting flat rocks. He found 5 under a maple tree. He already had 1 in his basket. Then how many flat rocks did he have?
10. One duck was swimming in a pond. Five others came into the water. Then there were how many ducks in the pond?
11. Jack and Tom were watching the bears in the park. They saw 5 black bears and 1 brown bear. How many bears did they see in all?
12. Five lights were burning in the room. Another light was turned on. Then how many lights were burning?
13. Peg is hanging doll dresses on the line to dry. She has hung out 4 dresses, and now she is hanging out 2 more. In all, how many dresses are on the line?
14. Paul counted 2 birds in the tree outside his window. Soon 4 more birds flew to the tree. Then how many birds were in the tree?
15. On the playground are 4 girls and 2 boys. How many children are there altogether?
16. Mrs. Hall was sick. Four friends came to see her one day. Two other friends came the next day. How many friends visited her on those days?
17. Yesterday 3 letters came in the mail. Today 2 more letters came. How many letters came altogether?
18. Three boys were skating on the pond. Then 3 girls came to skate. That made how many children skating on the pond?

Take-Away Problems

1. Farmer Brown had 3 pigs in a pen. One pig crawled through a hole in the fence and ran away. That left how many pigs in the pen?
2. Harry had 5 books on the table. He took 1 to read. How many books were left on the table?
3. Roy had 5 apples. He gave away 4 of them. How many apples did Roy keep for himself?
4. Betty brought 5 roses to school. She gave 4 of them to the teacher. How many roses did she have left?
5. Five children were playing a game. Two of them went home. How many children were left to play?
6. Jerry had 5 little kittens. He gave 2 of them to his sister. How many kittens did Jerry keep for himself?
7. Helen's mother bought her 5 balloons. While playing with them, Helen broke 3 of them. How many balloons did Helen have then?
8. Five chicks were in the garden. Mother Hen called, "Cluck, cluck." Three chicks came running. How many stayed in the garden?
9. Ruth had 6 pencils. She lost 1 of them. How many pencils did she have then?
10. Six puppies were playing in the street. One of them followed a man and went away. That left how many puppies in the street?
11. There were 6 panes of glass in a window. Five of the panes were broken. How many good panes were left in the window?
12. Mrs. Allen bought 4 stamps. She used 3 of them. How many stamps did she have then?
13. The store man had 6 boxes of oranges. He sold 2 boxes of oranges. How many boxes of oranges did he still have to sell?
14. The little boy had 6 blocks on the floor. He hid 2 of them. How many blocks were then on the floor?
15. There were 6 eggs in the refrigerator. We used 4 of them for breakfast. How many eggs were then left in the refrigerator?
16. Mr. Todd had 6 big rocks in his yard. He carried away 4 of them. Then how many rocks did he still have in his yard?
17. The store man had 6 jack-o-lanterns. He sold 3 of them. How many jack-o-lanterns were left in the store?
18. I had 6 cents. I spent 3 cents at the store. How many cents do I still have?

Objectives 14 and 15 are mentioned here, as in other periods, to hold constantly before you the facts that your pupils should use in their own affairs what they learn in arithmetic and that they should develop healthy attitudes, appreciations, and values respecting the subject.

Following next are some suggestions (suggestions only, remember!) for teaching *Primer* pages 27-54. *Primer* page 54 provides some testing for the period as a whole.



Teaching Primer Page 27

Pupil's Objective. To continue study of the ordinals *first* through *fifth* in identifying the positions in a series.

Background. *Primer* pages 27 and 28 together make a unit on the ordinals through *fifth*. All the work on page 27 is for identification, and the work is oral. All the work on page 28 has to do with reproduction.

Pre-book Lesson

1. Adapt some such activity as the following to ascertain prior to the Book Lesson just what the children really remember about ordinals. (They will have had some oral experiences prior to this.)

Have five children whose names are well known to the class stand in line at the front of the room. Say: **Tom is first in line from the left. In what place is Ann? Ellen? Bob? Ruth?**

2. Give practice in counting by ordinals: *first, second, third*, and so on. Call attention to the difference (both in words and in meaning) between these ordinals and the corresponding cardinals, *one, two, three, four*, and so on. *One, two, three*, and such cardinals always refer to groups of that size, while ordinals name the places of single items in a series.

Book Lesson

1. Ask questions about the toy train—for example: **One car is carrying coal. Which one is it, the first one behind the engine or the third one or the second one?**

27



2. Discuss with the class as you wish, the picture of the Indian counter, but be sure that the children note that a series of five boxes of objects is represented. Say: **Look at the arrows. Are they in the first box from the left or the fifth box or the fourth box in the row on the counter?** Continue with similar questions for the headdress, bow, quiver, and moccasins.

3. For kitten on steps say: **Is there anything on the fifth step? . . . On which step has the mother cat put her front paws? . . . her hind paws? . . . On which step is the kitten?**

4. Ask comparable questions about the shelves (for example, **On which shelf are the plates?**).

Differentiations and Extensions

1. Use ordinals to identify places of things on many occasions in the school day.

2. It is possible to have written activities for *all children* in connection with this page if all do well on the oral work. They can be asked to put X on the third step from the top, the second cup, and so on.

NOTES

*Remember: When you see this symbol, watch for opportunities in the lesson to use the Ginn Arithme-Stick described on *Teachers' Edition* page 9.



Pupil's Objective. To continue study of the ordinals through *fifth* (this time reproduction).

NOTES

Book Lesson

1. For the first row say: **Help Cappy put a tail on the first kite. Draw a mouth on the second kite face . . . ears on the fifth kite face . . . eyebrows on the fourth kite face.**

2. For the second row say: **Draw another smokestack on the first boat . . . smoke from the smokestack of the third boat . . . a sail on the second boat . . . a flag on the fourth boat . . . and put X on the fifth boat.**

3. For the third row say: **Make the fifth balloon go "pop" by putting X on it. . . . Draw a string for the first balloon. . . . Make a face on the fourth balloon.**

4. For the fourth row say: **Draw smoke coming from the third airplane. . . . Draw a ring around the second airplane. . . . Draw a man on the fifth airplane.**

5. Fifth row: Tell the children to draw whatever they want on each of the five lines at the bottom of the page. Say: **Color the second thing you have drawn yellow . . . the third thing red . . . the fifth thing blue.**

Differentiations and Extensions. Pages of seatwork for *slower learners*, with exercises modeled after those on this page, can provide practice. Organize pupils who need help into a small group and either you or your helpers can give directions of the kind illustrated above.

28



Pupil's Objectives: (a) To learn the number word *four*; (b) to learn to write the figure 4 and to use it and the numerals 1 to 3 in identifying patterns and the number words to *four*; and (c) to get more practice in reproducing groups to and including 6, when given the numerals.

New Word: *four*

Pre-book Lesson

1. Just as for *Primer* pages 18 and 19, demonstrate the writing of the numeral 4 at the chalkboard. Emphasize the guide lines, dot, and arrows. Note that there are two starting places used in writing the numeral 4 and that an arrow helps with the second starting place.

2. Put some starting dots and guide lines on the chalkboard and let several children go to work.

Book Lesson

1. In connection with the four real objects pictured at the left of each row, make sure that the pupils know the number word *four* and the figure 4 which they will learn to write.

2. When the pupils have finished the first four rows of writing the numeral 4, they are to make use of the skill in the fifth row by identifying standard patterns for groups to 4 and number words through *four*.

3. The pupils should be able to work independently on the exercises that maintain ability in reproduction of groups through 6. The first of the two rows at the foot of the page calls for circling

part of a group too large. The bottom row calls for increasing a group too small when the group given is in a known pattern arrangement.

Differentiations and Extensions
















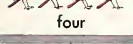






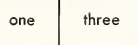
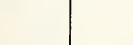



1. If you feel that more work is needed in identification and reproduction, mimeograph sets of exercises like those at the foot of *Primer* page 29 for seatwork.

2. Write the numerals 1 through 6 on the chalkboard. Have pupils copy these down and see if they can draw the pattern for each number.

3. All pupils can add to their sets of simple drawings with correct figures under them, by making now a drawing for a group of 4.

NOTES

29

					
four					
					
four					
					
four					
					
four					
				four	one
					
4	6	5	3		
					
5	4	3	6		

Pupil's Objectives: (a) To study the number 7 more intensively; (b) to learn to read the numeral 7; and (c) to learn that the group of 7 is one larger than the group of 6.

Background. Here we begin a four-page unit on the number 7 exactly parallel in organization to the preceding unit for 6 (*Primer* pages 22–25). The activity on *Primer* pages 30, 31, and 32 is identification; that on page 33 is reproduction.

Teacher's Preparation. Have ready the materials for adding to the classroom *Number Dictionary Chart* a row for 7 (picture, numeral, and number word).

Prepare or have your more capable children prepare cards for 7 for your several sets of *Picture Number Cards* and *Pattern Number Cards*, to be used in practice with the newly learned number.

Pre-book Lesson. As you and your pupils add the material for 7 to the classroom *Number Dictionary Chart* have pupils relate the new group to the 6-group, discovering that it is one more.

Book Lesson

1. For the number dictionary at the top of the page say: Count the number of doll hats in the first box. . . . What is that little figure in the corner (7)? . . . Why is it there? What does it tell us? Cover one of the hats. How many hats do you see now? Seven is how many more than six? Next, In the next little picture (the squares) do you see the same figure? What does it mean? . . . What does it tell us? . . . Are there really that many little squares in the picture? . . . Count and see. Next, Here is the little figure again, but there is no picture. So, you can draw one. Put as many balls (or what not) in your picture as the figure tells you you should have. Put them in the same pattern as the squares, 2 across the top row, 3 across the middle row, and 2 across the bottom row.

2. Study with your children the large picture, first relating it to the children's own experiences. (The picture is intended to provide a social setting for the lesson, to show that 7, and other numbers, are normal occurrences in life.) Be sure that your children know the names of all the objects and that they recognize the fact that these objects are in groups. Then ask these "how many" questions about the picture, until all groups of objects in the picture have been identified quantitatively. Ask: How many doll dresses do you see? . . . toy kittens? . . . toy dogs? . . . books? . . . pillows? . . . dolls? . . . spools of thread? and so on.

3. Numerals in serial order at the bottom of the page allow for experiences in bringing 7 into the series.

Differentiations and Extensions

1. For all pupils organize flash-card practice (and don't forget the work with serial order) with the *Picture Number Cards* and the *Pattern Number Cards*, this time including the cards for 7.

2. For slower learners use helpers from among your more capable children to whom you have given sets of individual *Number Cards*, including 7.

3. To the extent desirable, make use of the seatwork and games previously suggested. The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

4. Your more capable children may wish to make exact comparisons involving the 7-group and those of smaller size, using the *Number Dictionary Chart*.

Reminder. Are you making frequent use of the ordinals through *fifth*?

NOTES

30



1 2 3 4 5 6 7

Pupil's Objectives: (a) To practice identifying groups to and including 7, using the number symbols; and (b) to compare the relative sizes of groups through 7 when they appear in isolation.







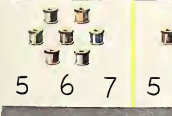
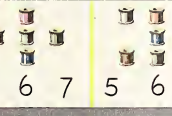
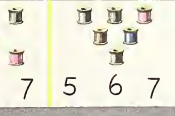
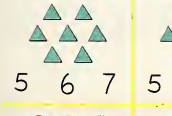
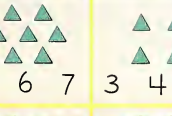
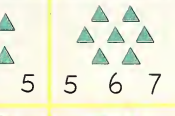



Pre-book Lesson

1. Using the set of *Pattern Number Cards* (including the pattern for 7), give some work on identification of patterns for groups to 7.
2. In case your pupils may need a little reminding, give some practice on the chalkboard of the type on *Primer* page 31. Use pictures of real objects and of representative items in pattern arrangements.

Book Lesson

1. Ask: What do you think we are to do with the picture showing the doll dresses? Cappy has been helping you. (Find out how many there are and then circle the correct figure.) ... How many doll dresses are there? ... Which of the figures did Cappy circle? ... All right; now make heavier the ring around 7 that Cappy has started for you.
2. If it is needed, give help to the class as a whole with one or two more exercises. Then have the *more capable children* finish the page independently. You will thus have time to work with individuals or with small groups of children for whom the task on this page is too difficult.
3. When all have completed the page, check the work orally with the class for accuracy.

31

 5 6 7	 5 6 7	 5 6 7
 5 6 7	 5 6 7	 5 6 7
 5 6 7	 5 6 7	 5 6 7
 5 6 7	 5 6 7	 5 6 7
 5 6 7	 5 6 7	 5 6 7

4. Call attention to the use of the new pattern (7) in certain of the boxes in the last three rows.
5. Make use of this page for oral maintenance experiences in *comparison* of the sizes of groups. At the same time you will be maintaining *ordinals*.
 - a. For the two rows of boxes at the top of the page which show doll clothes, ask:

In which box are there the fewest doll clothes?
Are there more doll hats than there are doll blouses?
Are there just as many doll coats as there are doll hats?

- b. For the row of spoons, ask:

Are there more spoons in the first box than in the last box?
Are there fewer spoons in the second box than in the first box?
- c. For the row of triangles, ask:

Which box has the fewest triangles in it?
Are there more triangles in the first box than in the last box?

Differentiations and Extensions

1. For *slower learners* who need further comparison experiences, use the last two rows on *Primer* page 31 as follows:
 - a. For the row of half-moons, ask:

Which box has more, the second box or the fourth box?
Which box has fewer, the first box or the last box?
 - b. For the row of stars at the bottom of the page, ask:

Which box has the least stars in it?
Are there more stars in the first box than in any other box?
2. Have *all pupils* identify various groups on *Primer* page 31 that are *one* more than specific groups you indicate there.
3. Have *more capable children* identify various groups that are *two* or *three* more than specific groups you indicate.
4. The following games, selected from *Teachers' Edition* pages 15-25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

NOTES

Pupil's Objectives: (a) To develop the ability to identify the 7-group and smaller groups as they appear in functional settings rather than in isolated ones, indicating the size of the group by circling the written figure; and (b) to learn to compare the sizes of groups through 7 when they appear in functional settings.

Background. This represents a familiar form of activity for the children—encountered previously on *Primer* pages 10 and 24.

Book Lesson

1. Discuss the functional picture with the children, identifying the items shown there and asking how many of each item there are. Give the children opportunity to talk about similar scenes from their own personal experience.

2. Work the first exercise below the picture together with the children for illustrative purposes. Have the children tell how many pillows they see in the large picture. Then have them circle the numeral which tells how many.

3. The children should be able to do the written work independently. Before having them go ahead, however, be certain that they understand what is to be identified in each instance:

- the number of chairs
- the number of airplanes (regardless of type or model)
- the number of freight cars (excluding the engine)
- the number of books
- the number of pictures (regardless of size or scene)
- the number of balls
- the number of cars or autos (regardless of kind or type)

As the children independently circle the figures to tell how many in each instance, circulate among the children to offer assistance to the extent that you feel necessary.

4. Make use of this page for oral maintenance experiences in *comparison* of the sizes of groups.

For the big picture of the boys playing with their trains and airplanes at the top of the page, ask:

Are there more freight cars than airplanes?

Are there just as many balls as there are pillows?

Is the pillow on the top bunk higher than all the pictures?

Which is the biggest ball?

Differentiations and Extensions

1. Extend the practice in identification up to 7 to include experiences in recognizing (a) a certain number of sounds; (b) a certain number of touches on the hand by another pupil; (c) the total number of items of a kind in the room, even if not all in a group together; and (d) the number of names called out by the teacher.

2. For *slower learners* who need further experience with group comparisons in functional settings, go back to the picture on *Primer* page 30 and ask questions similar to those asked about the picture on *Primer* page 32.

3. Have *all children* make various group comparisons (through groups of 7) as they appear in the functional classroom setting.

4. Have your *more capable children* make *exact* comparisons with groups in functional settings.

32



	1 2 3 4 5		1 2 3 4 5
	2 3 4 5 6		3 4 5 6 7
	3 4 5 6 7		3 4 5 6 7
	3 4 5 6 7		3 4 5 6 7



Pupil's Objective. To reproduce groups as large as 7 (a) by drawing the whole group; (b) by completing groups that have been started; (c) by selecting from groups too large; and (d) by combining all of one group with part of another.

Background. This is the last page of the sequence of pages devoted to 7. The four pages make up a unit in two different senses—(1) that the unit is built around the number and the numeral; and (2) that there is a social setting—the play activities. Do not fail to point out that numbers have their place in a social setting or activity.

Book Lesson

1. For the ball exercises ask: **Who thinks he knows what to do with all the ball pictures? . . . What does the big figure 7 in the middle tell us to do?** Try to elicit that each space, when the work has been done, is to show seven balls. (If pupils do not volunteer this information, tell them.) Then ask: **What must we do with the box where Cappy has drawn 1 ball? How many balls are needed there? . . . To have seven balls in each of the other boxes, what must we do?** As soon as the children are capable of working alone, have them proceed. Inspect their work, and help the *slower learners* who are in trouble.
2. Propeller pictures: In this row, groups of indicated sizes are to be selected from larger groups. To the extent possible, have the children tell what is to be done and how to do it. Help with the first exercise, where Cappy is working, should be enough.
3. Triangle pictures: Here, beginning with the left group

whose pattern they should recognize, the children take enough from the second group to get the group required. Proceed as in the exercises above.

Differentiations and Extensions

1. Extend the practice in reproduction up to 7 to include experiences with (a) making a certain number of sounds; (b) touching another pupil's hand a certain number of times; and (c) calling out a certain number of pupil names.
2. For the *slower learners* provide mimeographed sheets of exercises of the types shown on the *Primer* page. Keep these types in separate sections as on *Primer* page 33. (Note that there are several kinds of activity.)
3. For the *more capable children*, provide mimeographed sheets on which all the types of reproduction are mixed.

LOOKING AHEAD

For rote counting and enumerating through 40, follow the suggestions given on Teaching *Primer* Page 25 for developing rote and rational counting through 30. For groups of this size there will be less opportunity to provide experience in rational counting because of the sizes of the groups involved. For this reason you may need to give greater emphasis to activities associated with rote counting and the serial order of the number words, and less emphasis to the actual enumeration of groups.

NOTES

33

7

7

5

6

7

7

7

Pupil's Objectives: (a) To study the number 8 more intensively; (b) to learn to read the numeral 8; and (c) to learn that the group of 8 is one larger than the group of 7.

Background. Here starts the four-page unit on 8 which is comparable in organization to that for 6 (pages 22–25 of the *Primer*) and to that for 7 (pages 30–33). On pages 34, 35, and 36 your pupils will engage in activities requiring identification; on page 37, in activities requiring reproduction. The figure 8 is taught on page 34 and is used over and over again in the exercises on the next three pages, and thereafter as often as possible. On page 34 pupils should be led to note that, in the serial order, 8 follows immediately after 7.

Teacher's Preparation. Have ready the materials for adding to the classroom *Number Dictionary Chart* a row for 8 (picture, numeral, and number word).

Prepare or have your *more capable children* prepare cards for 8 for your several sets of *Picture Number Cards* and *Pattern Number Cards*, to be used in practice with the newly learned number.

Pre-book Lesson. As you and your pupils add the material for 8 to the classroom *Number Dictionary Chart* have pupils relate the new group to the 7-group, discovering that it is one more.

Book Lesson

1. For the number dictionary at the top of the page say: **Count the clown hats in the first box. . . . What is that little figure in the corner (8)? . . . Why is it there? What does it tell us? Cover one of the clown hats. How many hats do you see now? Eight is how many more than seven? Next, In the next little picture (the dots) do you see the same numeral? What does it mean? . . . What does it tell us? . . . Are there really that many little dots in the picture? . . . Count and see. Next, Here is the little figure again, but there is no picture. So you can draw one. Put as many balls (or what not) in your picture as the figure tells you you should have. Put them in the same pattern as the dots.**

2. Study with your children the large picture, first relating it to the children's own experiences. (The picture is intended to provide a social setting for the lesson, to show that 8 and other numbers are normal occurrences in life.) Be sure that your children know the names of all the objects and that they recognize the fact that these objects are in groups. Then ask these "how many" questions about the picture, until all groups of objects in the picture have been identified quantitatively. Ask: **How many giraffes do you see? . . . ladder trucks? . . . doll hats? . . . drums? . . . cups? . . . horns? . . . toy elephants? . . . dolls? . . . toy soldiers? . . . trucks? . . . children? and so on.**

3. Numerals in serial order at the bottom of the page allow for experiences in bringing 8 into the series.

Differentiations and Extensions

1. For *all pupils* organize flash-card practice (and don't forget the work with serial order) with the *Picture Number Cards* and *Pattern Number Cards*, this time including the cards for 8.

2. For *slower learners* use helpers from among your *more capable children* to whom you have given sets of individual *Number Cards*, including 8.

3. To the extent desirable, make use of the *seatwork* and *games* previously suggested. The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2);

Fish with Bait; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

4. Make use of this page for oral maintenance experiences in *comparison* of the sizes of objects.

For the big picture of the toy window below the three boxes at the top of the page, ask:

Is the girl taller than the boy?

Are the elephants bigger than the giraffes?

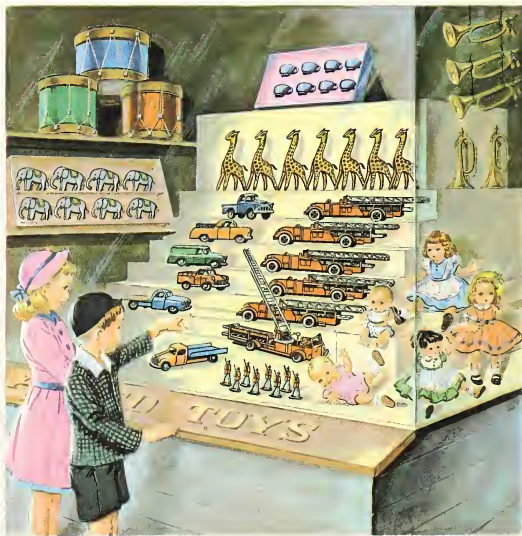
Are the teacups smaller than the drums?

5. Have your *more capable children* make *exact* comparisons involving the 8-group and those of smaller size, using the *Number Dictionary Chart*.

Reminder. Are you checking on ability to identify and enumerate groups to 40?

NOTES

34



1 2 3 4 5 6 7 8

Pupil's Objectives: (a) To learn to identify groups to and including 8, using the number symbols; and (b) to compare the relative sizes of groups through 8 when they appear in isolation.







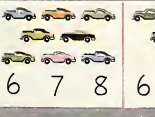

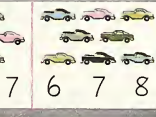







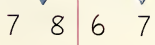

Pre-book Lesson

- Using the *Pattern Number Cards* (including the pattern for 8), give some work on identification of patterns for groups to 8.
- In case your pupils may need a little reminding, give some practice on the chalkboard of the type on *Primer* page 35. Use pictures of real objects and of representative items in patterns.

Book Lesson

- Ask: **What do you think we are to do with the picture showing the clowns?** (Find out how many there are and then circle the correct figure.) . . . **How many clowns are there?** . . . **Which of the figures should you circle?** . . . All right; now make a ring around 8.
- If it is needed, give help to the class as a whole with one or two more exercises. Then have the *more capable children* finish the page independently. You will thus have time to work with individuals or with small groups of children for whom the task on this page is too difficult.
- When all have completed the page, check the work orally with the class for accuracy.
- Call attention to the use of the new pattern (8) in certain of the boxes in the last three rows.

35

 6 7 8	 6 7 8	 6 7 8
 6 7 8	 6 7 8	 6 7 8
 6 7 8	 6 7 8	 5 6 7
 6 7 8	 6 7 8	 6 7 8
 6 7 8	 4 5 6	 6 7 8
 6 7 8	 6 7 8	 6 7 8

5. Make use of this page for oral maintenance experiences in *comparison* of the sizes of groups. Ordinals will be maintained also.

a. For the two rows of toys at the top of the page, ask:

Are there as many clowns as there are soldiers?

Are there fewer horns than drums?

Are there more elephants than giraffes?

b. For the row of cars, ask:

Which box has the least cars in it?

Are there fewer cars in the first box than in the fourth box?

Are there more cars in the third box than in the second box?

c. For the row of stars, ask:

Are there more stars in the first box than in the last box?

Are there just as many stars in the second box as in the third box?

Differentiations and Extensions

1. For *slower learners* who need further comparison experiences, use the last two rows on *Primer* page 35 as follows:

a. For the row of dots, ask:

Are there fewer dots in the first box than in the fourth box?

Are there more dots in the second box than in the third box?

b. For the row of diamonds at the bottom of the page, ask:

Which box has the fewest diamonds in it?

Are there more diamonds in the first box than in any other box?

2. Have *all children* identify various groups on *Primer* page 35 that are *one more* than specific groups you indicate there.

3. Have *more capable children* identify various groups that are *two more* or *three more* than specific groups you indicate.

4. The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

NOTES

Pupil's Objectives: (a) To develop the ability to identify the 8-group and smaller groups as they appear in functional settings rather than in isolated ones, indicating the size of each group by circling the written figure; and (b) to learn to compare the sizes of groups through 8 when they appear in functional settings.

Background. The nature of the activity is not unfamiliar to the child. He has done this before on *Primer* pages 10, 24, and 32. (He also will do the same thing later on *Primer* pages 42 and 46.) You may wish to refer the children back to *Primer* page 10 or 24 or 32 before working with this page.

Book Lesson

1. Discuss the functional picture with the children. Identify the various things shown in the picture and ask how many of each thing there are. Give the children opportunity to talk about a similar scene within their own experience.

2. Work the first exercise below the picture together with the children for illustrative purposes. Have the children tell how many records they see in the big picture. Then have them circle the numeral which tells how many.

3. Have the children work the remaining exercises independently, but first be certain that each child understands what to find in each instance:

- the number of turkey drawings
- the number of girls
- the number of crayons
- the number of pots of flowers
- the number of books
- the number of chairs
- the number of record players

Circulate among the children, giving appropriate help as needed.

4. Make use of this page for oral maintenance experiences in *comparison* of the sizes of groups.

For the big picture of the children in the classroom at the top of the page, ask:

Which are there more of—girls or pictures of turkeys?

Which are there fewer of—chairs or pots of flowers?

Are there just as many books as there are records?

Differentiations and Extensions

1. Extend the practice in identification up to 8 to include experiences in recognizing (a) a certain number of sounds; (b) a certain number of touches on the hand by another pupil; (c) the total number of items of a kind in the room, even if not all in a group together; and (d) the number of names called out by the teacher.

2. For *slower learners* who need further experience with group comparisons in functional settings, go back to the picture on *Primer* page 34 and ask questions similar to those asked about the picture on *Primer* page 36.

3. Have *all pupils* make various group comparisons (through groups of 8) as they appear in the functional classroom setting.

4. Have the *more capable children* make *exact* comparisons with groups in functional settings.

36



4 5 6 7 8



2 3 4 5 6



2 3 4 5 6



4 5 6 7 8



1 2 3 4 5



4 5 6 7 8



4 5 6 7 8



1 2 3 4 5

Pupil's Objective. To reproduce groups as large as 8 (a) by drawing the whole group; (b) by completing groups that have been started; (c) by selecting from groups too large; and (d) by combining all of one group with part of another.

Background. This is the last page of the sequence of pages devoted to 8. The four pages make up a unit in two different senses—(1) that the unit is built around the number and the numeral; and (2) that there is a social setting—children's activities. Do not fail to point out that numbers have their place in a social setting or activity.

Book Lesson

1. For the crayon exercises ask: **Who thinks he knows what to do with all the crayon pictures? . . . What does the big figure 8 in the middle tell us to do?** Try to elicit that each space, when the work has been done, is to show 8 crayons. (If pupils do not volunteer this information, tell them.) Then ask: **What must we do with the box where Cappy has drawn 1 crayon? How many crayons are needed there? . . . To have 8 crayons in each of the other boxes, what must we do?** As soon as the children are capable of working alone, have them proceed. Inspect their work, and help the *slower learners* who are in trouble.

2. Pictures of rings: In this row, groups of indicated sizes are to be selected from larger groups. To the extent possible, have the children tell what is to be done and how to do it. Help with the first exercise should be enough.

3. Pictures of triangles: Here, beginning with the left group

whose pattern they should recognize, the children take enough from the second group to get the group required. Proceed as in the exercises above.

Differentiations and Extensions

1. Extend the practice in reproduction of groups as large as 8 to include experiences with (a) making a certain number of sounds; (b) touching another pupil's hand a certain number of times; and (c) calling out a certain number of pupil names.

2. For the *slower learners* provide mimeographed sheets of exercises of the types shown on the *Primer* page. Keep these types in separate sections as on *Primer* page 37. (Note that there are several kinds of activity.)

3. For the *more capable children*, provide mimeographed sheets on which all the types of reproduction are mixed.

Reminder. Have you been making use of the games previously described to secure practice in such skills as identifying the numerals?

The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

LOOKING AHEAD

For rote counting and enumerating through 50, follow the suggestions given on Teaching *Primer* Page 25 for developing rote and rational counting through 30. For groups of this size there will be less opportunity to provide experience in rational counting because of the sizes of the groups involved. For this reason you may need to give greater emphasis to activities associated with rote counting and the serial order of the number words, and less emphasis to the actual enumeration of groups.

NOTES

37

8

8

6

7

8

8



Pupil's Objectives: (a) To learn the number word *five*; (b) to learn to write the figure 5 and to use it and other numerals in identifying patterns and the number words to *five*; and (c) to get more practice in reproducing groups to and including 8, when given the numerals.

New Word: *five*

Pre-book Lesson

1. As for *Primer* pages 18, 19, and 29, demonstrate the writing of 5 at the chalkboard. Emphasize the guide lines, dot, and arrows.
2. Put some starting dots and guide lines on the chalkboard and let several children go to the board to make the numeral 5.

Book Lesson

1. In connection with the five real objects (vegetables) pictured at the left of each row, make sure that the pupils know the number word *five* and the figure 5 which they will learn to write.
2. When the pupils have finished the first four rows of writing the numeral 5, they are to make use of the skill in the fifth and sixth rows by identifying standard patterns for groups to 5 and number words through *five*.
3. The pupils should be able to work independently on the exercises in reproduction of groups through 8. The row at the foot of the page calls for increasing a group too small when the group given is in a known pattern arrangement.

Differentiations and Extensions

1. If you feel that more work is needed in identification and reproduction, mimeograph sets of exercises like those at the foot of *Primer* page 38 for seatwork.
2. Have the pupils turn back to *Primer* page 20 and write the required numerals in the boxes at the foot of the page. Formerly the pupils drew rings around the correct numerals.
3. All pupils can add to their sets of simple drawings with correct figures under them, by making now a drawing for a group of 5.

LOOKING AHEAD

At this point, we want to suggest another set of Looking-Ahead activities, involving this time manipulative experiences to discover that a group may be thought of in terms of its component parts.

Select for use with your class from the following situations:

1. Have 5 children at a table, with 3 of them sitting down and 2 of them standing.

Ask how many children there are in all.
Ask how many children are sitting down.
Ask how many children are standing.

Lead to the statement: We see 5 children as 3 children and 2 children.

2. In a similar way, use 4 children, with 2 sitting and 2 standing, to show 4 as 2 and 2.

3. Similarly, show 3 children as 2 children and 1 child.

4. Now use 5 children with books—4 with books open and 1 with book closed—to show 5 as 4 and 1.

5. Use 4 children—1 with a paper hat and 3 without—to show 4 as 1 and 3.

6. Use 5 blocks—2 of one color and 3 of another—to show 5 as 2 and 3.





7. Using a comparable situation of your own choice, show:





- 2 as 1 and 1;
- 4 as 3 and 1;
- 3 as 1 and 2;
- 5 as 1 and 4.





8. Now use children or objects to show components through *spatial separation*; for example, show 4 children seated at a table—2 on one side and 2 on the other side. Select from the various groupings used previously. In each instance have the members of the class or group (a) identify how many in the whole group; (b) identify how many in each part; and (c) make a statement involving the whole group and its parts.





NOTES

38

 five	5	5	5	5	5
 five	5	5	5	5	5
 five					
 five					

				four	five	three

				five	two	five

7	6	8	5
			

Pupil's Objective. To review and maintain the following number abilities: (a) a knowledge of the number series from 1 to 8; (b) the writing of numerals through 5; and (c) reproduction of groups through 8.

Background. Note that lately attention has been centered not on the serial order of the numbers so much as on their meaning and the use of the separate numerals. Pages 20, 21, and 26 of the *Primer* have provided experiences relating to the serial order of 1 to 6 only. *Primer* page 39 extends serial order to 8.

Teacher's Preparation. Have available the set of *Picture Number Cards* including the card for 8.

Pre-book Lesson

1. Give each of a group of 8 children one *Picture Number Card*, and arrange the children in irregular order in front of the class so that, as the numerals on their cards are held up for all to see, they read from the left 8, 2, 5, 3, 7, 1, 4, 6. Have the children exchange places so that the cards will read from the left 1, 2, 3, 4, 5, 6, 7, 8. Let other members of the class help in this rearrangement.
2. Repeat several times with the cards exposed in differing irregular order. Use the entire class. You may want to have three groups race to see which can rearrange the fastest.

Book Lesson

1. Ask: **What do you think we must do with the picture of the circles in the first box at the top of the page?** Lead the children to suggest that the circle between circle 2 and circle 4

has no numeral in it and that it should be circle 3. Call attention to the circles numbered 6, 1, 3, 8, 5 above. Have the children trace over what Cappy has drawn, completing a line from the correct upper circle to the blank one between circle 2 and circle 4. They should be able to complete the exercise by themselves.

2. The next exercise in row 1 and the three exercises in row 2 involve knowing the place of a numeral in the series to 8, in order to circle or write the numeral *after* in a series of 3 numerals and the numeral *before* in a series of 2 numerals. The pupil is to circle one of the two numerals in the exercises which have figures beside the boxes and write the numerals in the exercises that have no figures beside the boxes.

3. The exercises in reproduction of groups in the last three rows on this page are familiar to the pupil and are for purposes of practice on three kinds of reproduction he has already learned to perform—increasing a group too small, decreasing a group too large, and, when two groups are given, choosing enough from the second group to make the first group the size called for. Your *more capable pupils* may be able to alternate written experiences back and forth from one type to another instead of working all of one row, then all of another, and so on.

Differentiations and Extensions. If you feel that the *slower learners* and perhaps *all pupils* need more of the type of review and maintenance provided on this page, mimeographed sheets of material similar to that on *Primer* page 39 will be helpful.

LOOKING AHEAD

At this point we would suggest that you extend the oral and manipulative experiences with ordinal concepts to include *sixth* through *tenth*.

Pattern your activities and experiences after those used in the Looking-Ahead section for *first*, *second*, and *third* in connection with teaching *Primer* page 7.

1. First see how well your pupils already may know the ordinals to *tenth*. For example, say, **Bring me the sixth book on the shelf.** Or, line up 8 children along the wall as a group for a game and say, **If the seventh child is to be "It," who will it be?** Discuss the answers, both correct and incorrect, to discover how your pupils think in making their selections.

2. Then refer to a row of ten houses you have drawn on the board. Ask a child to tell you which house has a door; which has a chimney, and so on.


3. Draw a column of ten blocks on the board. Ask someone to tell on which block the letter *J* appears; the letter *F*; and so on, all counted *from the bottom*. Then counting *from the top*, ask similar questions.

4. After the inventory suggested above, provide numerous experiences with children and objects in which the ordinals through *tenth* are counted in the normal sequential order before setting up experiences in which the ordinals will be called for in a mixed or variable order.

5. When using experiences in which the ordinals are called for in a mixed or variable order, it is not necessary to call for all ten ordinals within the same experience or situation. For example: In one experience with ten children or objects, call for the following ordinal responses: eighth, third, tenth, fifth, and first. In another experience with ten children or objects, call for these ordinal responses: second, ninth, sixth, fourth, and seventh.

NOTE: The *Primer* provides no *written* experiences involving ordinals beyond *fifth*. Thus, the work in this section is looking ahead to *Book One* rather than to a later page of the *Primer*.

39



⑥ ① ③ ⑧ ⑤

① ② ④ ⑦

5	6	
4	5	
6	7	

8 7

6 7


5 8

5	6		7
7	6		8


	6
	3

	5
	4


8




7



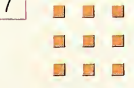
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6



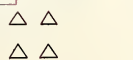
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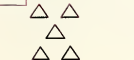
8




7



6



8





Pupil's Objectives: (a) To study the number 9 more intensively; (b) to learn to read the figure 9; and (c) to learn that the group of 9 is one larger than the group of 8.

Background. *Primer* pages 40, 41, 42, and 43 make the four-page unit for 9 similar to earlier units for the numbers 6, 7, and 8. The unit is organized around cowboys and their equipment; hence, here is a social as well as an arithmetical unit.

Teacher's Preparation. Have ready the materials for adding to the classroom *Number Dictionary Chart* a row for 9 (picture, numeral, and number word).

Prepare or have your *more capable children* prepare the cards for 9 for your several sets of *Picture Number Cards* and *Pattern Number Cards*, to be used in practice with the newly learned number.

Pre-book Lesson. As you and your pupils add the material for 9 to the classroom *Number Dictionary Chart*, have pupils relate the new group to the 8-group, discovering that it is one more.

Book Lesson

1. For the number dictionary at the top of the page say: **Count to find the number of guns in the first box. . . . What is that little figure in the corner (9)? . . . Why is it there? What does it tell us? Cover one of the guns. How many guns do you see now? Nine is how many more than eight? Then, In the next little picture (the diamonds) do you see the same figure? What does it mean? . . . What does it tell us? . . . Are there really that many little diamonds in the picture? . . . Count and see. Next, Here is the little figure again, but there is no picture for the number. So you can draw one. Put as many balls (or what not) in your picture as the numeral tells you you should have. Put them in the same pattern as the diamonds.**

2. Study with your children the large picture, first relating it to the children's own experiences. (The picture is intended to provide a social setting for the lesson, to show that 9, and other numbers, are normal occurrences in life. This is a situation in which all your pupils will be thoroughly interested.) Be sure that the children know the names of all the objects and that they recognize the fact that these objects are in groups. Then ask these "how many" questions about the picture, until all groups of objects in the picture have been identified quantitatively. Ask: **How many holsters do you see? . . . belts? . . . shirts? . . . cowboy hats? . . . cowboy spinning ropes? . . . spurs? . . . kerchiefs? . . . pairs of boots? . . . guns?** and so on.

3. Numerals in serial order at the bottom of the page allow for experiences in bringing 9 into the series.

Differentiations and Extensions

1. For *all pupils* organize flash-card practice (and don't forget the work with serial order) with the sets of *Picture Number Cards* and *Pattern Number Cards*, this time including the cards for 9.

2. For *slower learners* use helpers from among your *more capable children* to whom you have given sets of individual *Number Cards*, including 9.

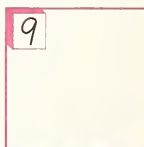
3. To the extent desirable, make use of the *seatwork* and *games* previously suggested, extending the number series to include 9. The following games, selected from *Teachers' Edition* pages 15-25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

4. Have your *more capable children* make *exact* comparisons involving the 9-group and those of smaller size, using the *Number Dictionary Chart*.

Reminder. Are you checking on ability to enumerate and identify groups to 50?

NOTES

40



1 2 3 4 5 6 7 8 9

Pupil's Objectives: (a) To practice identifying groups to and including 9, using the number symbols; and (b) to compare the relative sizes of groups through 9 when they appear in isolation.








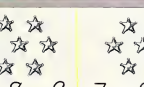
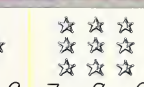



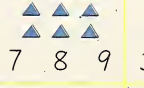
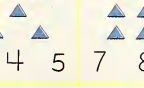
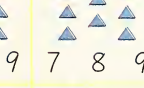
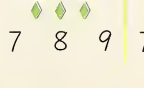


Pre-book Lesson

- Using the *Pattern Number Cards* (including the pattern for 9), give some work on identification of patterns for groups to 9.
- In case your pupils may need a little reminding, give some practice on the chalkboard of the type on *Primer* page 41. Use pictures of real objects and representative items in patterns.

Book Lesson

- Ask: **What do you think we are to do with the picture showing the cowboy hats?** (Find out how many there are and then circle the correct figure.) . . . **How many cowboy guns are there?** . . . **Which of the figures do you circle?** . . . All right; now make a heavy ring around 8.
- If it is needed, give help to the class as a whole with one or two more exercises. Then have the *more capable children* finish the page independently. You will thus have time to work with individuals or with small groups of children for whom the task on this page is too difficult.
- When all have completed the page, check the work orally with the class for accuracy.
- Call attention to the use of the new pattern (9) in certain of the boxes in the last three rows.

41

 7 8 9	 7 8 9	 7 8 9
 7 8 9	 7 8 9	 7 8 9
 7 8 9	 7 8 9	 7 8 9
 6 7 8	 7 8 9	 6 7 8
 7 8 9	 3 4 5	 7 8 9
 7 8 9	 7 8 9	 7 8 9

5. Make use of this page for oral maintenance experiences in *comparison* of the sizes of groups.

a. For the pictures of cowboy things in the first two rows at the top of the page, ask:

**Are there more hats than cowboy guns?
Which are fewer,—boots or spurs?**

b. For the row of badges (third row), ask:

Are there more badges in the first box than in the last box in this row?

Are there just as many badges in any other box as there are in the first box?

Which box has the fewest badges?

c. For the row of dots (fourth row), ask:

Are there more dots in the first box than in the last box in this row?

Are there more dots in any other box than there are in the first box?

In which box are there the least dots?

Differentiations and Extensions

1. For *slower learners* who need further comparison experiences, use the last two rows on *Primer* page 41 as follows:

a. For the row of triangles, ask:

Does the second box have the most triangles or the fewest triangles?

Which boxes have more triangles than the last box?

b. For the row of diamonds at the bottom of the page, ask:

**Does the first box have more diamonds than any other box?
Does the last box have less diamonds than any other box?**

2. Have *all pupils* identify various groups on *Primer* page 41 that are *one more* than specific groups you indicate there.

3. Have *more capable children* identify groups that are *two more* or *three more* than specific groups you indicate.

4. The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

Reminder. Are you having your pupils now and then “solve problems” with real objects or with cutout representative materials on your flannel board? (See *Teachers' Edition* page 74 where put-together and take-away problems are supplied from which you can pick some for use in this period of instruction.)

NOTES

Pupil's Objectives: (a) To develop the ability to identify the 9-group and smaller groups as they appear in functional settings rather than in isolated ones, indicating the size of each group by circling the written figure; and (b) to learn to compare the sizes of groups through 9 when they appear in functional settings.

Background. The nature of the activity is not unfamiliar to the child. He has done this before on *Primer* pages 10, 24, 32, and 36. (He also will do the same thing later on *Primer* page 46.) You may wish to refer the children back to *Primer* page 10 or 24 or 32 or 36 before working with this page.

Pre-book Lesson. Talk with the children about cowboy and cowgirl experiences they may have had. Give special attention to the various things in the picture.

Book Lesson

1. Discuss the functional picture with the children. Identify the various things shown in the picture. Give the children opportunity to talk about a similar scene within their own experience.

2. Work the first exercise below the picture together with the children for illustrative purposes. Have the children tell how many boots (single boots, not pairs) they see in the picture. Then have them circle the numeral which tells how many.

3. Have the children work the remaining exercises independently, but first be certain that each child understands what to find in each instance:

- the number of fence posts
- the number of horses
- the number of cowgirl shirts
- the number of calves
- the number of cowboy shirts
- the number of cowboy and cowgirl hats
- the number of trees

Circulate among the children, giving appropriate help as needed.

4. Make use of this page for oral maintenance experiences in comparison of the sizes of objects and groups.

For the big picture at the top of this page, ask:

- Are there more calves than horses?
- Are there fewer men than children?
- Are there as many trees as there are horses?
- Is there a horse for each man to sit on?
- Are there fewer girls than boys?

Differentiations and Extensions

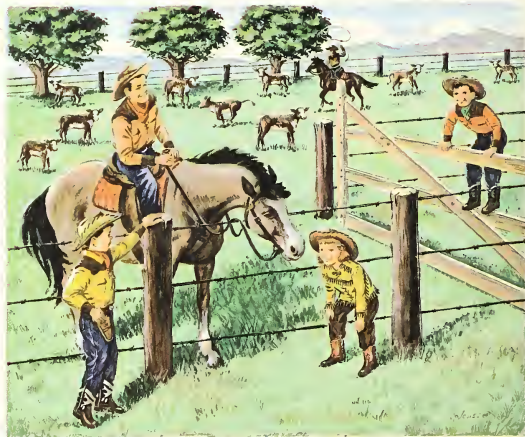
1. Extend the practice in identification up to 9 to include experiences in recognizing (a) a certain number of sounds; (b) a certain number of touches on the hand by another pupil; (c) the total number of items of a kind in the room, even if not all in a group together; and (d) the number of names called out by the teacher.

2. For *slower learners* who need further experience with group comparisons in functional settings, go back to the picture on *Primer* page 40 and ask questions similar to those asked about the picture on *Primer* page 42.

3. Have *all pupils* make various group comparisons (through groups of 9) as they appear in the functional classroom setting.

4. Have the *more capable children* make *exact* comparisons with groups in functional settings.

42



	5 6 7 8 9		5 6 7 8 9
	2 3 4 5 6		1 2 3 4 5
	5 6 7 8 9		2 3 4 5 6
	3 4 5 6 7		2 3 4 5 6

Pupil's Objective. To reproduce groups as large as 9 (a) by drawing the whole group; (b) by completing groups that have been started; (c) by selecting from groups too large; and (d) by combining all of one group with part of another.

Background. This is the last page of the sequence of pages devoted to 9. The four pages make up a unit in two different senses—(1) that the unit is built around the number and the numeral; and (2) that there is a social setting—the cowboy and cowgirl activities. Do not fail to point out that numbers have their place in a social setting or activity.

Book Lesson

1. For the hat exercises at the top of the page, ask: **Who thinks he knows what to do with all the hat pictures? . . . What does the big figure 9 in the middle tell us to do?** Try to elicit that each space, when the work has been done, is to show 9 hats. (If pupils do not volunteer this information, tell them.) Then ask: **What must we do with the box where Cappy has drawn a hat? How many hats are needed there? . . . To have nine hats in each of the other boxes, what must we do?** As soon as the children are capable of working alone, have them proceed. Inspect their work, and help the *slower learners* who are in trouble.

2. Hat pictures in next to bottom row: In this row, groups of indicated sizes are to be selected from larger groups. To the extent possible, have the children tell what is to be done and how to do it. Help with the first exercise should be enough.

43

		<div style="font-size: 48px; font-weight: bold; margin: 0 auto;">9</div>	
			
			

<div style="border: 1px solid black; padding: 5px; display: inline-block;">9</div> 	<div style="border: 1px solid black; padding: 5px; display: inline-block;">7</div> 	<div style="border: 1px solid black; padding: 5px; display: inline-block;">9</div> 
<div style="border: 1px solid black; padding: 5px; display: inline-block;">8</div> 	<div style="border: 1px solid black; padding: 5px; display: inline-block;">9</div> 	<div style="border: 1px solid black; padding: 5px; display: inline-block;">9</div> 

3. Squares pictures: Here, beginning with the left group whose pattern they should recognize, the children take enough from the second group to get the group required. Proceed as in the exercises above.

Differentiations and Extensions

1. Extend the practice in reproduction up to 9 to include experiences with (a) making a certain number of sounds; (b) touching another pupil's hand a certain number of times; and (c) calling out a certain number of pupil names.

2. For the *slower learners* provide mimeographed sheets of exercises of the types shown on the *Primer* page. Keep these types in separate sections as on *Primer* page 43. (Note that there are several kinds of activity.)

3. For the *more capable children*, provide mimeographed sheets on which all the types of reproduction are mixed.

LOOKING AHEAD

At this point, we want to suggest a set of Looking-Ahead activities involving manipulative experiences with the underlying addition idea, that of putting two groups together and finding how many in all.

Select from the following list problems to be actively dramatized step-by-step by the children, using real or representative objects as needed. The problems are to be read orally to the children.

1. Two children were at the arithmetic table. Two more children came to the table. Then there were how many children in all at the arithmetic table?

(Have two children sitting at the arithmetic table. Have two other children come and join them. Have the members of the class or group determine how many children in all are at the arithmetic table. Emphasize questions such as: **How many children were in the arithmetic corner at first? What did some other children do? How many did this? How many children in all were then in the arithmetic corner?** Finally lead to the statement: *2 children and 2 children are 4 children.*)

Continue dramatizing problems in a similar manner. In each instance emphasize questions such as those above and conclude with the pertinent statement of fact.

2. Three children were playing an arithmetic game. Two more children came to play the game with them. How many children in all were then playing the game?

3. Bill (use a child's name in the class) had two cents. His father gave him one more cent. How many cents in all did Bill have then?

4. One child was writing at the chalkboard. Three more children came to the chalkboard to write. Then how many children in all were writing at the chalkboard?

5. Sue put four crayons on her desk. Then she put one more crayon on her desk. How many crayons in all did Sue put on her desk?

6. Tom saw one chair at the table. He took two more chairs to the table. How many chairs in all were at the table then?

7. Jean drew one stick man on her paper. Then she drew one more stick man. How many stick men in all did Jean draw on her paper?

*8. Tim saw two frogs in a pond. Then he saw three more frogs jump into the pond. How many frogs in all did Tim see in the pond?

*9. Alice had one dress for her doll. Then her mother made four more doll dresses for her. How many dresses in all did Alice then have for her doll?

*10. Ted saw three cars in front of his house. Then one more car stopped in front of the house. How many cars in all were in front of Ted's house?

*These problems are purposely cast to require the use of representative materials rather than real objects.



Pupil's Objectives: (a) To study the number 10 more intensively; (b) to learn to read the number symbol 10; and (c) to learn that the group of 10 is one larger than the group of 9.

Background. The four-page unit on 10 (*Primer* pages 44–47) is built around bakery products—an organization of work identical to that done for studying each of the numbers 6, 7, 8, and 9. Again you have both an arithmetical and a social unit. On pages 44, 45, and 46 your pupils will engage in activities requiring identification; on page 47, in activities requiring reproduction. The symbol is taught on page 44 and is used over and over again in the exercises on the next three pages, and thereafter as often as possible. On page 44 pupils should be led to note that in the serial order, 10 follows 9 immediately. Also they should begin to realize that the symbols for all numbers larger than 9 have two figures or more.

Teacher's Preparation. Have ready the materials for adding to the classroom *Number Dictionary Chart* a row for 10 (picture, numeral, and number word).

Prepare or have your *more capable children* prepare the cards for 10 for your several sets of *Picture Number Cards* and *Pattern Number Cards*, to be used in practice with the newly learned number.

Pre-book Lesson. As you and your pupils add the material for 10 to the *Number Dictionary Chart* have pupils relate the new group to the 9-group, discovering that it is one more.

Book Lesson

1. For the number dictionary at the top of the page say: **Count the number of gingerbread men in the first box. . . . What do you see in the little box in the upper corner (10)? . . . Why is it there? What does it tell us? Cover one of the gingerbread men. How many gingerbread men do you see now? Ten is how many more than nine? Next, In the next little picture (the stars) what do you see in the upper corner? What does it mean? . . . What does it tell us? . . . Are there really that many stars in the picture? . . . Count and see. Next, Here is 10 again, but there is no picture. So you can draw one. Put as many balls (or what not) in your picture as the numeral tells you you should have. Put them in the same pattern as the stars.**

2. Study with your children the large bakery-goods picture, first relating it to the children's own experiences. (The picture is intended to provide a social setting for the lesson, to show that 10, and other numbers, are normal occurrences in life.) Be sure that your children know the names of all the objects and that they recognize the fact that these objects are in groups. Then ask these "how many" questions about the picture, until all groups of objects in the picture have been identified quantitatively. Ask: **How many doughnuts do you see? . . . rolls? . . . brownies? . . . lady fingers? . . . gingerbread men? . . . round cupcakes? . . . pieces of pie? . . . square cakes? . . . cookies?**

3. Numerals in serial order at the bottom of the page allow for experiences in bringing 10 into the series.

Differentiations and Extensions

1. For *all pupils* organize flash-card practice (and don't forget the work with serial order) with the class *Picture Number Cards* and *Pattern Number Cards*, this time including the cards for 10.

2. For *slower learners* use helpers from among your *more capable children* to whom you have given sets of individual *Number Cards*, including 10.

3. To the extent desirable, make use of the *seatwork* and *games* previously suggested, extending the number series to include 10. The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

4. Have your *more capable children* make exact comparisons involving the 10-group and those of smaller sizes, using the *Number Dictionary Chart*.

Reminder. Are you checking on ability to enumerate in order to reproduce groups of 50?

NOTES

44



Pupil's Objectives: (a) To learn to identify groups to and including 10, using the number symbols; and (b) to compare the relative sizes of groups through 10 when they appear in isolation.

















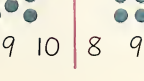
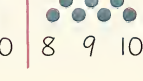
Pre-book Lesson

- Using the *Pattern Number Cards* (including the pattern for 10), give some work on identification of patterns for groups to 10.
- In case your pupils may need a little reminding, give some practice on the chalkboard of the type on *Primer* page 45. Use pictures of real objects and representative items in patterns.

Book Lesson

- Ask: **What do you think we are to do with the picture showing the cookies?** (Find out how many there are and then circle the correct numeral.) ... **How many cookies are there?** ... **Which of the figures should you circle?** ... **All right; now make a heavy ring around 9.**
- If it is needed, give help to the class as a whole with one or two more exercises. Then have the *more capable children* finish the page independently. You will thus have time to work with individuals or with small groups of children for whom the task on this page is too difficult.
- When all have completed the page, check the work orally with the class for accuracy.
- Call attention to the use of the new pattern (10) in certain of the boxes in the last three rows.

45

 8 9 10	 8 9 10	 8 9 10
 7 8 9	 8 9 10	 7 8 9
 8 9 10	 8 9 10	 8 9 10
 8 9 10	 8 9 10	 8 9 10
 8 9 10	 8 9 10	 8 9 10
 8 9 10	 8 9 10	 8 9 10

5. Make use of this page for oral maintenance experiences in *comparison* of the sizes of groups.

a. For the pictures of the bakery goods in the first two rows at the top of the page, ask:

Are there more cookies in the first box than cupcakes in the second box?

Which are fewer—gingerbread men or little pies?

b. For the row of doughnuts (third row), ask:

Are there more doughnuts in the first box than in the last box in this row?

Are there just as many doughnuts in any other box as there are in the first box?

Which box has the fewest doughnuts?

c. For the row of triangles, ask:

Are there more triangles in the first box than in the last box in this row?

Are there more triangles in any other box than there are in the first box?

In which box are there the fewest triangles?

Differentiations and Extensions

1. For *slower learners* who need further comparison experiences, use the last two rows on *Primer* page 45 as follows:

a. For the row of diamonds, ask:

Does the first box have the most diamonds or the same number as in another box?

Which boxes have more diamonds than the fourth box?

b. For the row of dots at the bottom of the page, ask:

Does the first box have more dots than any other box?

Does the second box have less dots than any other box?

2. Have *all pupils* identify various groups on *Primer* page 45 that are *one more* than specific groups you indicate there.

3. Have *more capable children* identify groups that are *two more* or *three more* than specific groups you indicate.

4. The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Climb the Ladder* (1) and (2); *Connecto*; *Cross the River* (1) and (2); *Dominoes* (1) and (2); *Fish* (1) and (2); *Fish with Bait*; *Hooked* (1); *Knock, Knock*; *Numberland* (1); *Old Hat* (1) and (2); *Out of Order* (1) and (2); *Spin It* (1) and (2); *The Wizard* (1); *Zooks*.

NOTES

Pupil's Objectives: (a) To develop the ability to identify the 10-group and smaller groups as they appear in functional settings rather than in isolated ones, indicating the size of each group by circling the written symbol; and (b) to learn to compare the sizes of groups through 10 when they appear in functional settings.

Background. The nature of the activity is not unfamiliar to the child. He has done this before on *Primer* pages 10, 24, 32, 36, and 42. You may wish to refer the children back to some of these pages before working with this page.

Book Lesson

1. Discuss the functional picture with the children. Identify the various things shown in the picture. Give the children opportunity to talk about a similar scene within their own experience.

2. Work the first exercise below the picture together with the children for illustrative purposes. Have the children tell how many candles they see in the picture. Then have them circle the numeral which tells how many.

3. Have the children work the remaining exercises independently, but first be certain that each child understands what to find in each instance:

- pans, hanging or otherwise
- cupcakes
- windows (even though only part of each is seen)
 - not individual window panes
- cookies with holes in them
- rolling pins
- cooking spoons
- star cookies
- round cookies
- canisters or cans

4. Make use of this page for oral maintenance experiences in comparison of the sizes of objects and groups.

For the big picture at the top of this page, ask:

- Which is taller, Mother or child?
- Are there more round cookies than star cookies?
- Are there fewer canisters than pans?
- Are there as many rolling pins as cooking spoons?
- Are there as many round cookies as cupcakes?
- Are there fewer star cookies than cupcakes?

Differentiations and Extensions

1. Extend the practice in identification up to 10 to include experiences in recognizing (a) a certain number of sounds; (b) a certain number of touches on the hand by another pupil; (c) the total number of items of a kind in the room, even if not all in a group together; (d) the number of names called out by the teacher; and (e) in remembering the number of people at the dinner table yesterday.

2. For *slower learners* who need further experience with group comparisons in functional settings, go back to the picture on *Primer* page 44 and ask questions similar to those asked about the picture on *Primer* page 46.

3. Have *all pupils* make various group comparisons (through groups of 10) as they appear in the functional classroom setting.

4. Have the *more capable children* make *exact* comparisons with groups in functional settings.

46



	4	5	6	7		3	4	5	6
	7	8	9	10		2	3	4	5
	7	8	9	10		1	2	3	4
	1	2	3	4		7	8	9	10
	6	7	8	9		3	4	5	6

Pupil's Objective. To reproduce groups of as many as 10 (a) by drawing the whole group; (b) by completing groups that have been started; (c) by selecting from groups too large; and (d) by combining all of one group with part of another.

Background. This is the last page of the sequence of pages devoted to 10. The four pages make up a unit in two different senses—(1) that the unit is built around the number and the numeral; and (2) that there is a social setting—the bakery goods. Do not fail to point out that numbers have their place in a social setting or activity.

Book Lesson

1. For the doughnut exercises ask: **Who thinks he knows what to do with all the doughnut pictures? . . . What does the big numeral 10 in the middle tell us to do?** Try to elicit that each space, when the work has been done, is to show 10 doughnuts. (If pupils do not volunteer this information, tell them.) Then ask: **What must we do with the box where Cappy has drawn 1 doughnut? How many doughnuts are needed there? . . . To have 10 doughnuts in each of the other boxes, what must we do?** As soon as the children are capable of working alone, have them proceed. Inspect their work, and help the *slower learners* who are in trouble.

2. Pictures of cookies: In this row, groups of indicated sizes are to be selected from larger groups. To the extent possible, have the children tell what is to be done and how to do it. Help with the first exercise should be enough.

47

The grid contains the following elements:

- Top Section:** A central box with the numeral "10". To its left is a box with 1 circle. To its right are two boxes, each with 3 circles. Below the central box are two boxes, each with 2 circles. To the left of the central box are two boxes, each with 4 circles. To the right of the central box are two boxes, each with 4 circles.
- Bottom Section:** A row of six boxes. The first three boxes contain the numbers 10, 9, and 10. The last three boxes contain the numbers 8, 10, and 10. Below each number box is a box containing small objects (cookies or diamonds) to be counted or grouped.

3. Pictures of diamonds: Here, beginning with the left group whose pattern they should recognize, the children take enough from the second group to get the group required. Proceed as in the exercises above.

Differentiations and Extensions

1. Extend the practice in reproduction up to 10 to include experiences with (a) making a certain number of sounds; (b) touching another pupil's hand a certain number of times; and (c) calling out a certain number of pupil names.

2. For the *slower learners* provide mimeographed sheets of exercises of the types shown on the *Primer* page. Keep these types in separate sections as on *Primer* page 47. (Note that there are several kinds of activity.)

3. For the *more capable children*, provide mimeographed sheets on which all the types of reproduction are mixed.

Reminder. Are you giving oral practice on the ordinals through *tenth*?

LOOKING AHEAD

At this point we want to suggest a set of Looking-Ahead activities involving manipulative experiences with the underlying subtraction idea, that of separating a group into two parts, one of which is taken away, the remaining part to be found.

Select from the following list problems to be actively dramatized step-by-step by the children, using real or representative objects as needed. The problems are to be read orally to the children.

1. Four children were writing at the chalkboard. Two of them finished and sat down. How many children were left at the chalkboard? (Have four children at the chalkboard, writing. Have two of them finish and return to their seats. Have the members of the class or group determine how many children are left at the chalkboard. Emphasize questions such as: **How many children were at the chalkboard to begin with? What happened to some of them? To how many? How many children were left?** Finally lead to the statement: *4 children take away 2 children is 2 children.*)

Continue dramatizing problems in a similar manner. In each instance emphasize questions such as those above and conclude with the pertinent statement of fact.

2. Five children were sitting at the arithmetic table. Three children went back to their desks. How many children were left at the arithmetic table?

3. Three children were playing a word game. The teacher asked one of them to come up to her desk. How many children were left to play the game?

4. Jack (use a child's name in the class) had 5 pencils. He gave one of them to Sue (use another child's name in the class). How many pencils did Jack have then?

5. Jane made four X's on the chalkboard. Then she erased three of them. How many X's were then on the chalkboard?

6. Tom found 5 reading books on the shelf. He took four of them for the children in his reading group. How many books were left on the shelf?

7. Betty saw two chairs at the table. She took one of them to her desk. How many chairs were at the table then?

*8. Jack saw four taxis in front of the hotel. One of them drove away. How many taxis were left in front of the hotel?

*9. Jill saw five birds on a wire. Two of them flew away. How many birds were on the wire then?

*10. Joe had three balloons. Two of them burst. How many balloons did Joe have left?

*These problems are purposely cast to require the use of representative materials rather than real objects.

Pupil's Objectives: (a) To summarize several important relationships among groups through 10; and (b) to review and reproduce the standard patterns for groups through 10.

Teacher's Preparation. Make 10 simple paper sombreros.

Pre-book Lesson. Up to this point in the text, your pupils have been concentrating more or less on the building of concepts for the individual numbers from 1 to 10. Your *more capable children* may have been giving some thought to the idea that 5 is 1 more than 4 and that 4 is 1 less than 5, and so on. Now *all pupils* can get some notion of the *1 more* and *1 less* generalization by class activities of the following nature, dealing with the numbers to 10.

1. Have 10 children stand in a line at the front of the room, each holding a paper sombrero. Proceed somewhat in this way saying: **When I call out "one," the first pupil (Jack) is to put on his sombrero. Let's begin. One!** (Jack puts on his sombrero.) **How many children have on sombreros?—(one)—When I call out "two," the next pupil in line (Betty) will put on her sombrero. Two!** Now how many children have on sombreros?—(two)—Proceed in this way until all ten pupils in line are wearing sombreros.

Ask the other pupils in the class to tell what they noticed each time the next number was called out and another sombrero was put on. Try to draw out the reply (or tell the class if necessary) that each number in the series is *1 more* than the number preceding it. Put more simply, 6 is 1 more than 5, 7 is 1 more than 6, and so on. With very little effort, many of your pupils will arrive at the generalization that when you add 1 the sum is 1 more in the number series.

2. As a reversal of the *1 more* activity, begin with the 10 pupils wearing sombreros and call out "nine," "eight," "seven," and so on, whereupon the tenth pupil, the ninth, the eighth, removes his sombrero until only 1 pupil wears his sombrero.

From this activity, try to draw out (and this is a little harder) that each number in the series is *1 less* than the number which follows it. Again put more simply (which is probably the way your pupil will word it for you), 6 is 1 less than 7, 5 is 1 less than 6, and so on. The idea will begin to take root that when you take away 1, the number left is 1 less in the number series.

You may want also to get in some oral review of ordinals to *length*. You have a particularly good opportunity to ask, **In which place is Sue standing? Jane? Sam?** and so on.

Book Lesson

1. Talk with the children about the picture at the top of the page, for the time being excluding the standard patterns of stars down the right-hand column.

a. Have the children look down the rows of sleeping men, telling the number in each row. Ask the children how each row, from top to bottom, is different from the one before it. (Each row has one more.) Then ask the children, **What is 1 more than 6? 1 more than 2? 1 more than 9?** etc.

b. In a similar manner have the children look at the rows of men from bottom to top: for example, from 10 to 1. Bring out the idea that going from bottom to top, each row has 1 less man. Then ask questions such as, **What is 1 less than 4? 1 less than 10?** etc.

2. To maintain the ordinal concept, ask the children to do the following: **Look at the row of 5 sleeping men. Draw a ring around the third. Look at the row of 8 men. Draw a ring around the fifth. Look at the row of 3 men. Draw a ring around the first. Look at the row of 7 men. Draw a ring**

around the fourth. Look at the row of 6 men. Draw a ring around the second.

3. Now have the children look at the patterns of stars for use with each of the numbers, 1–10. These are the familiar standard patterns with which children have been working.

In the boxes at the bottom of the page ask the children to **draw a "dot picture" for each of the numbers, 1 to 10.** They are to make each dot picture in the same pattern as the corresponding "star picture" at the top of the page.

Differentiations and Extensions

1. For *more capable children*, use the rows of sleeping men to develop the idea of 2 more (and possibly 2 less) in a manner similar to that done for 1 more (and 1 less).

2. Have *slower learners* cover the numerals in the *number dictionary* and then uncover them one by one as a check while they count the men in each row, one row at a time.

3. Have the helper cover the numerals and as he points to a pattern, the *slower learner* will try to tell the number without counting. After each answer, the helper has him count the men in the row and then shows him the numeral for that row.

4. Have *all pupils* make their own number dictionary, using circles instead of men and no patterns. Have them make sure that they have shown clearly one more in each row.

48

1		*
2		**
3		***
4		****
5		*****
6		*****
7		*****
8		*****
9		*****
10		*****

1	2	3	4	5
6	7	8	9	10

Pupil's Objectives: (a) To show a knowledge of the serial order of the separate numerals in the series to 10; and (b) to write the figures 1 to 5 in sequence.

Background. As each number following 5 has been studied intensively, the symbol for that number has been taught with emphasis on its position in the series. Here, as on *Primer* page 48, the whole span is assembled for the study of serial order.

Teacher's Preparation. Be sure that the children have scissors and paste. Have available the *Number Dictionary Chart* through 10, together with sets of *Number Cards*.

Pre-book Lesson

1. Give each of 10 children one of the *Picture Number Cards*, and arrange the children in irregular order in front of the class so that, as the numerals on their cards are held up for all to see, they may read from the left 9, 6, 3, 10, 4, 2, 5, 8, 1, 7. With help from the rest of the class, have the children exchange places so that the cards will read 1 to 10 from the left.

2. Repeat several times with the cards exposed in differing irregular order. Use the entire class.

Book Lesson

1. Instruct the children to cut along the blue dashed line near the bottom of the page, cutting off the last row of material. Then they can cut out the individual boxes of objects—the boys,

the sailboats, and the blocks. Then in the first three rows of exercises—the objects are to be pasted into their corresponding series, their places being found by using the numerals.

2. On the blank lines (foot of page after the cutting), the children merely write the figures in the series 1 to 5.

Differentiations and Extensions

1. Give a set of individual *Picture Number Cards* to each of your helpers. Have the helpers arrange the cards on a table or on the chalk tray, in irregular order, for *slower learners* to rearrange and put in proper sequence. Suggest that the helpers repeat this procedure using various irregular arrangements of cards until their partners are able to arrange the numerals correctly without hesitation.

2. Mimeograph "surprise pictures" similar to those at the top of *Primer* page 21 to make use of the serial order of the numerals to 10.

3. Games for *all children* calling for the correct serial order of the numerals can be organized for enjoyable practice. *Hopscotch* serves as a good example. Sketch on the floor or on the playground an outline numbering each block from 1 to 10. Have children hop from one block to another in order from 1 to 10. The pattern of blocks and the order of numbering should be varied for diversified practice. Variations of this game may be made by tossing bean bags into boxes in succession.

The following games, selected from *Teachers' Edition* pages 15–25, may be used with appropriate limitations at this time: *Connecto*; *Cross the River* (1) and (2); *Hooked* (1); *Out of Order* (1) and (2).

LOOKING AHEAD

At this point, we want to suggest a set of Looking-Ahead activities for recognizing some common measuring instruments and the occasions for their use.

1. Have as many of the following measuring instruments available as you conveniently can:

- a. Length—foot rule, yardstick, tape measure
- b. Weight—kitchen scales
- c. Capacity: Liquid—measuring cup, quart container, gallon jug
- d. Capacity: Dry—quart basket, peck measure, bushel basket
- e. Other—clock, thermometer (house, cooking, and clinical)

2. Talk with children about measures and the idea of measuring. Emphasize the idea that we measure to find how much of something.

3. Refer to the collection of measuring instruments you have on hand. Ask the children to identify as many of them as they can. In each case emphasize the name of the instrument and the thing(s) it measures.

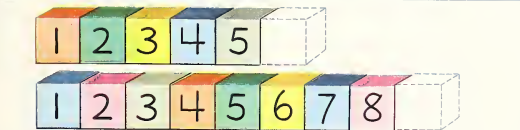
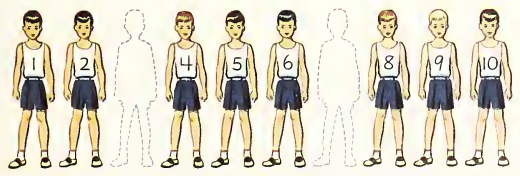
4. Ask the children which instruments they may have used and under what conditions.

5. Ask the children to mention other measuring instruments they may have used.

6. Deal with units of measure only indirectly as they may arise in relation to the measuring instruments. When talking about the ruler, for example, you may deal casually with the idea of 1 foot and 1 inch.

7. Use some of the measuring instruments in actual measurement. Measure the length of a desk top, the weight of a book, the temperature of the room, and so on. Do not emphasize this aspect of measurement, however. Only deal with it as it may arise naturally in relation to the previous activities.

49



Teaching Primer Page 50

Pupil's Objective. To learn how to identify time (hour) from a clockface.

Background. *Primer* pages 50 and 51 are a unit on telling time, but time only on the even hour to 10 (since 10 is the largest number studied by your class). The exercises on page 50 call for identification; those on page 51, for reproduction.

Here again there will probably be a considerable range of ability among your pupils. In the Pre-book Lesson and the early part of the Book Lesson, find those few pupils who can be entrusted to work through the exercises on the page by themselves. (You can check their work when they are through.) Meanwhile you can give your attention to those who need the most help.

Teacher's Preparation. If you do not have a large clock with easily movable hands and clearly identifiable numerals on the face, prepare one on cardboard.

Pre-book Lesson. Introduce a discussion of clocks and telling time (*a*) by asking the children how they (or their parents for them) know when they should leave home for school, how Dad knows when to get to work, and so on, or (*b*) by posing the question, **Let's just suppose that there were no clocks and no other way of telling time. Then what would happen?** In other words, adopt some procedure which will emphasize ahead of time the worth of the skill you are to teach.

Hold up a clock set at 2 o'clock and ask what time the clock shows. Regardless of the accuracy of the answers, have some of those who volunteer tell *why* they have chosen their answers, and allow other children to verify or correct. Lead the class to note (*a*) the difference in size of the two hands ("big" and "little" for now; not "minute" and "hour") and (*b*) the significance of their places on the clockface: on the hour the "big" hand is always "straight up" (or you may prefer, somewhat ahead of schedule, to teach the numeral 12), while the "little" hand is on one of the other numerals, and that numeral gives the hour its name.

Book Lesson

1. Ask: **What is the boy doing in the picture? What time is it? How do you know? Why do you suppose the boy is getting up?** Review the significance of the places of the hands on the clockface.

For the first exercise ask: **What do you think we are to do here? (Point.) . . . What time does the clock show? . . . How do you know? . . . Which of the figures under the clock—9 or 8 or 7—tells the time? . . . Then what do we do with that figure?** (Help Cappy circle it.)

Now look at the next clock. (Point.) **What does it say under the clock? . . . What are we to do with this clock?** (Circle the 5.)

2. Let the class try the third and fourth exercises and check the work orally. Allow those who can do so to proceed by themselves. Help the other children with the remaining exercises (or any part of them); or, if they are quite incapable of doing what is required, return for a time to activities with the clockface; then have them finish the page.

Differentiations and Extensions

1. Provide extra practice for the *slower learners* by giving to a helper (one who has thoroughly mastered the skill in question) a clockface and having him turn hands on the clock to show a variety of hours for identification by other pupils.

2. Make (or have your *more capable children* make) a clock of oak tag for each child or for each set of partners. *More capable children* can work with the *slower learners*. The *more capable child* may set the clock at an hour to be identified by the *slower learner* for practice.

3. Have *all pupils* try to decide events of the day associated with each time shown.

NOTES

50



7 8 9

4 5 6



4 3 2

6 3 4



1 2 3

6 7 8

8 7 10

5 3 9

Pupil's Objective. To learn how to show time on a clockface, when given either the minute hand in place or neither hand.

Pre-book Lesson. Use your pasteboard clockface to demonstrate ahead of time just what the children will do on the page. Set the minute hand pointing to the top and ask someone to make the clock show 7 o'clock. Obviously he must move the hour hand to the correct numeral, 7, the minute hand being undisturbed. Repeat with 3 o'clock, 8 o'clock, and so on. Note that the work on both *Primer* pages 50 and 51 involves hours to 10 o'clock only.

Book Lesson

1. Ask: **To what is the girl pointing in the picture? (big hand) . . . Where is it pointing? . . . To what is the boy pointing? (little hand) . . . Where is it on the clockface? To what numeral is it pointing? . . . Then what time does the clock show?**

2. For the first exercise ask: **Is the big hand pointing to the top? . . . The dotted little hand is pointing to what numeral? . . . Let us help Cappy make the dotted line black. . . . Now what time does the clock show? . . . Is that what you read under the clock?**

3. For the next exercise ask: **What does it say under the clock? . . . Then what must we do to make the clock show that time?**

4. If the children understand, let them finish the other six exercises in the first two rows. If not, help with another exercise or two.

5. Check orally the work in the first two rows by asking: **Then have you draw the big hand or the little hand on the clockface. To what numeral did you make it point? . . . Why?**

6. In the last row, ask: **What do you read under the first clock? . . . What are we to do on the clockface? . . . Are we given any help? How? (dotted lines) . . . Who will tell us how we can make the clock show 8 o'clock?** Have the class check and criticize suggestions until the correct procedure is hit upon, including the drawing of the big hand first.

Have the class try the second exercise, and check. As soon as they are able—most of them—to go ahead with the last two exercises without help, allow them to do so, while you assist those who are not so capable.

Differentiations and Extensions

1. Provide extra practice for the *slower learners* by giving to a helper (one who has thoroughly mastered the skill in question) a clockface with movable hands. He will require the *slower learner* to reproduce on the clockface one hour after another as the helper suggests.

2. Make or have the *more capable pupils* make for each set of partners a clockface with no hands. Make also for each pair of pupils a set of clock hands—a big hand and a little hand. The helper can then require his partner to show on the clockface any time (on the hour) which he suggests. Children will enjoy this activity and should become proficient in "setting" the clock.

LOOKING AHEAD

Now you may want to use some Looking-Ahead activities to extend the ability to tell and show time on the hour to 11 and 12 o'clock.


1. Using the clockface with movable hands, ask various children in turn to set the hands to show 1 o'clock, 2 o'clock, etc., through 10 o'clock. Then set the hands yourself to show 11 o'clock and ask who can tell what time it is now. Do the same with 12 o'clock. (If any children do not recognize the number symbols for 11 and 12, which have not been taught in the *Primer*, just tell them the names of these numerals and explain that they will be studied later.)













2. Ask children to suggest various things from their own in-school and out-of-school experience that may frequently happen at 11 o'clock or 12 o'clock.

3. Use familiar time situations to have the children both tell and show different times (on the hour), including 11 o'clock and 12 o'clock.

NOTES

51



 10	 5	 9	 6
 4	 7	 3	 1
 8	 2	 10	 7

Pupil's Objectives: (a) To learn about the dime and about its value in relation to the nickel and the cent; and (b) to study the relative values through number relationships.

Background. Read again the material and the whole lesson plan for *Primer* page 16.

Teacher's Preparation. Have some dimes, nickels, and cents available. You can make a chart to which you fasten (with scotch tape) a dime, a nickel, and a cent. Label the dime as 10¢, the nickel as 5¢, and the cent as 1¢, so the children will remember the ¢ sign.

Pre-book Lesson

1. Use real or "play" money and pass out a dime, a nickel, and a cent—one of each—to several children scattered about the room. Ask, first, that the nickels be held in the air; wait for checking by the other children. Then continue in the same way with the dime, then the cent.

2. Have the children with the sets of coins give them to other children and repeat.

3. Discuss with the children what things can be bought with a nickel, but not a cent; the things that cost a dime and cannot be bought with a nickel or a cent.

Book Lesson. The three coins are reproduced in color in natural size in the dictionary at the top of the page, each identified as to value through the use of the ¢ sign. In discussing the dictionary, be sure pupils understand that size of coin does not determine its real value. This idea is often missed by pupils.

1. For the first rows below the dictionary, say: **Here are different things that you can buy with a cent or a nickel or a dime. How can you tell how much each costs?**

In the first row, draw rings around the things that cost 1¢. . . .

Do the same in the second row for the things costing 5¢; and in the third row for those costing 10¢.

2. For the first exercise at the foot of the page ask: **How much money do you see here?** (Point and elicit "5 cents.") Now we want to find a numeral with a cent mark after it that means just the same, 5 cents. Which is it? . . . Now draw a ring around it.

What shall we do next? **How much money is there here?** (Point to the second row.) . . . Then which of the numerals with the cent mark shall we draw a ring around?

If your pupils are able to finish the page by themselves, encourage them to do so. You yourself can inspect the seatwork and furnish assistance to those who especially need it.

The exercise in the last row may cause some trouble (2 nickels = 10¢) and it was placed last on the page for that reason. However, more than likely most of your pupils have handled 2 nickels at a time and know their combined value.

Differentiations and Extensions

1. For your *slower learners* or for all if they need it, provide mimeographed sheets of exercises like those on this page.

2. You probably have sets of paper or metal coins to use in games like "playing store." If so, check to make sure that the relative worth of the coins is really known and respected in transactions. At this point, include the dime along with the cent and the nickel.

52

Pupil's Objective. To learn the equivalent values of selected combinations of coins.

Pre-book Lesson

1. Play a "Bank Game" with the children in the following manner. Using real or "play" coins, give

- 8 cents to Child A;
- 5 nickels to Child B;
- 11 cents to Child C;
- 1 nickel and 7 cents to Child D.

Show a nickel to Child A. Say, **Give me the same amount of money from the coins you have.** Do the same with Child C.

Show a dime to Child B. Say, **Give me the same amount of money from the coins you have.** Do the same for Child C; for Child D. Also try it with Child A who won't be able to do so.

In each instance have children make appropriate statements, such as:

Child A: "I will give you 5 cents for your nickel."

Child D: "I will give you 1 nickel and 5 cents for your dime."

Give help as needed in dealing with these equivalents.

2. Provide an opportunity for other children to play the game with you. Vary the distribution of coins slightly from time to time.

Book Lesson

1. Illustrate what is to be done in the first exercise. Call attention to the nickel, then to the cents. Ask the children how many

of the cents will be the same amount as the 1 nickel. Then have the children draw a ring around the specified number of cents.

2. Have the children work independently on the remaining examples. Give assistance as needed.

Differentiations and Extensions

1. For helping the *slower learners* who are not too familiar with money values, a game may be devised in which partners exchange coins of equivalent values. The *more capable child* probably should be paired with a *slower learner* and both children given a number of coins, real or "play" money. One pupil offers the other a coin for which he is to receive equal value in other coins.

2. Find out if *more capable pupils* can count by tens with dimes and by fives with nickels.

LOOKING AHEAD

Looking-Ahead experiences will introduce orally and manipulatively the identification of halves and one half of a single object.

1. Have two each of several objects that easily can be cut into halves with either knife or scissors: for example, two sheets of paper, two slices of bread, two candy bars, two paper plates (circular), and so on.

2. Talk with the children about sharing things equally with another child: the idea of sharing one thing so that each of two children will have just as much as the other.

3. Take one of the objects and cut it into halves. Then ask these important questions:

a. **Into how many pieces did I cut the slice of bread (or whatever)?**

b. **Is each piece the same size—just as big—as the other?** Do the same with several different objects.

4. Take another object and cut it into two unequal pieces. Ask the same questions as before. Emphasize that this time we again have two pieces, but one is bigger than the other.

5. Cut several other objects into two pieces—sometimes halves, sometimes not.

6. Tell the children that we have a special name we use when we cut something into two pieces that are the same size—we say we cut the object into *halves*; and we have a special name for each piece—each piece is *one half* of the object.

7. Use new objects or go back over those already cut, applying the names just introduced. Ask questions such as these:

Did we cut the apple into two pieces?

Is one piece just as big as the other?

Did we cut the apple into halves?

Is each piece one half of the apple?

8. Cut each of several objects into two unequal pieces to bring out that halves must be equal. Now extend the cutting to 3 pieces, either equal or unequal. In this instance bring out that since we cut the object into 3 parts—regardless of whether the parts are equal or unequal—we do not have halves.

9. Summarize the essential conditions for halves and one half: (1) the object must be cut into just *two* parts or pieces; and (2) both pieces must be the same size. Then the object has been cut into halves and each of the equal pieces is one half of the whole object.

53



Teaching Primer Page 54 (Period Test)

Pupil's Objective. To show on a test some of the things learned in the period.



















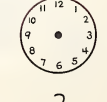
NOTES

Book Lesson

1. For the first exercise say: **Number the blocks from the bottom to the top. The first block is numbered. Cappy is putting 2 on the next block. Help Cappy write the "1" and "2."** Then make the numerals carefully and put them in the right order.

2. Previous lessons should enable pupils to work the rest of the page more or less independently. Give help only as needed. This is a test on identification of groups to 10; of reproduction of groups to 10 when given a group too small, a group too large, or two groups; and of the identification and reproduction of time on the hour. This page really should cause very little trouble. At least, if there is trouble, the page will point out to you the weak spots in the number abilities of your class.

54

	 8 9 10	 5 6 7	 6 7 8
	 5 6 7	 8 9 10	 7 8 9
9 	7 	8 	10 
10 	9 	8 	7 
 2 7 10	 4 5 7	 7	 2

Discussion of the Fourth Period of Instruction

Arithmetic Objectives for the Fourth Period of Systematic Instruction

- (1) Maintain and expand ability to use understandingly words for comparison of sizes and many quantitative terms other than numerals*
- (2) Maintain ability to read the numerals to 10 (and the number words to five) and to understand the place of each numeral in the series
- (3) Maintain ability to count by rote to 50 and to enumerate (for both identification and reproduction)
 - (a) orally with concrete materials to 50*
 - (b) in association with written numerals to 10
- (4) Maintain understanding of the numbers to 10 through comparison of sizes of groups and immediate recognition of patterned groups
- (5) Maintain ability to use ordinals
 - (a) orally through *tenth**
 - (b) with written experiences through *fifth*
- (6) Maintain ability to write the figures 1 through 5
- (7) Maintain experiences in connection with the symbol ϕ , and the relation among the dime, the nickel, and the cent
- (8) Maintain ability to deal with time on the hour (both identification and reproduction)
- (9) Develop ability to identify with written experiences several common measuring instruments, together with some knowledge of the occasions when they are used
- (10) Written experiences with the component parts of the numbers 2 through 5, introductory to the more specific number combinations for these numbers in addition and subtraction
- (11) Written experiences with the addition and subtraction facts with sums and minuends 2 through 5, horizontal form only (mastery of some facts for all and through sums and minuends of 5 for more capable pupils)
- (12) Written experiences in identifying halves of single objects (when the equal parts are shown)
- (13) Maintain ability to deal with simple problem situations by using real and representative objects*
- (14) Maintain the disposition to use, and the habit of using, number in practical ways*
- (15) Maintain possession of desirable emotionalized responses with respect to arithmetic—attitudes, appreciations, and values*

Discussion of Objectives

Because of discussions in the overviews for other periods of instruction (*Teachers' Edition* pages 32-33, 42-43, 73-74), no space will be taken here (except for *Objective 1*) to discuss in detail the first eight and the last two objectives listed above for maintenance work.

In connection with *Objective 1*, which refers to the ability to use understandingly many comparison and quantitative terms other than numerals. You will need the list below to add to those suggested on *Teachers' Edition* pages 33, 42, and 73. To the extent reasonably possible, you will want to include these words in your teaching for this period:

Oral Vocabulary List for Fourth Instructional Period

colder	deeper	farthest
coldest	deepest	faster
cooler		fastest
coolest	farther	flat

*These objectives are developed orally only, because either the *Primer* pages do not lend themselves to the learning in question or the material serves as readiness for written experiences to come later in the program.

gallon	longest	slowest
half dollar	mile	thicker
heavier		thickest
heaviest	nearer	thickness
height	nearest	thinner
hotter		thinnest
hottest	ounce	ton
inch	pint	warmer
		warmest
length	second (of time)	weight
lighter	shorter	wider
lightest	shortest	widest
longer	slower	width

In addition to the objectives to be maintained, instruction for the fourth period will extend experiences in *Objectives 9* to *13* as follows:

Objective 9. In the last period, you provided oral experiences in identifying measuring instruments (the cup, the thermometer, etc.) and the situations in which they are used. Now in connection with *Primer* pages 55 and 56, your pupils will have written experiences in identification. On *Primer* page 55 pupils will circle one of the three pictured measuring situations as the correct one for which the pictured measuring instrument is used. On page 56, the identification involves the reverse activity. Pupils will circle the one out of three measuring instruments to be used in connection with the measuring situation pictured.

Objective 10. This objective deals in the fourth period with written experiences in connection with the component parts of numbers, here the numbers 2 through 5 only. Each group of these sizes may be thought of as consisting of one or more pairs of parts which, when combined, give the total. The parts studied in this period are the following:

Parts of 2	Parts of 3	Parts of 4	Parts of 5
1 and 1	2 and 1	3 and 1	4 and 1
	1 and 2	2 and 2	3 and 2
		1 and 3	2 and 3
			1 and 4

Actually, if one knows that a group of 5 has the parts 4 and 1, he has the basis for the four number facts: in addition, $4 + 1 = 5$, $1 + 4 = 5$; in subtraction, $5 - 1 = 4$, $5 - 4 = 1$. As a matter of fact, in the next half year and later on, this relationship between a whole group and its parts is used in building the number facts in addition and subtraction. The four facts for addition and subtraction just cited will then be organized into what we call "the whole story about 5 and its parts 4 and 1."

At this time, however, we are content with much less knowledge than this. Our purposes are not so ambitious. We seek only (a) to give children another way of thinking of the numbers 2 through 5 (the component idea, beyond the serial and the group ideas) and (b) to make use of this way of thinking to move more closely to the addition and the subtraction facts for these numbers.

Primer pages 57 and 58 make use of the component parts of a group in the additive sense. On page 57 the two parts appear in the picture of real objects as filled ice-cream cups and cups not filled. The children fill the necessary cups and record the numbers representing the whole group and its parts. On page 58 the experiences deal with pictures of representative objects, circles, and triangles. Similar activity with parts is continued on

page 58, where the children deal with easily drawn representative objects (the circles and triangles), write the numeral describing the whole group and complete a statement of the parts.

Primer pages 67 and 68 use the component idea in the subtractive sense. Subtraction is, after all, the process (along with division later on) for separating a group into its parts. On page 67, in the first box, your pupils will "separate" a group of 4 pigs by drawing a "fence" so as to secure sub-groups (parts), 3 and 1, ending by recording the whole, "4 in all," and on the next line its parts, "3 and 1." Page 68 provides similar experiences with pictures of representative objects where the separation is shown by color.

On none of these four *Primer* pages (57, 58, 67, and 68) is it expected that the children will learn, as such, the relationships they discover between numbers and their parts. Your pupils are still exploring numbers and the answers they obtain for the exercises are to be regarded, both by them and by you, as short-hand records of things they have done.

Objective 11. After three periods of careful preparation, your pupils come to work with the addition facts with sums of 2, 3, 4, and 5 and the corresponding subtraction facts for these numbers; but, even so, pupils see them in horizontal form only, and without the signs +, -, and =. Instead of the signs + and = in an addition fact like $1 + 4 = 5$, they see "and" and "are" as in "1 and 4 are 5." Instead of the signs - and = in a subtraction fact like $4 - 2 = 2$, they see words as in "4 take away 2 is 2." (The signs +, -, and = are taught in the second half year, as is also the vertical form of writing the facts.)

Within the limitations mentioned above, your pupils will have experiences with the following facts:

Addition	Subtraction
$1 + 1 = 2$	$2 - 1 = 1$
$2 + 1 = 3$	$3 - 1 = 2$
$1 + 2 = 3$	$3 - 2 = 1$
$3 + 1 = 4$	$4 - 1 = 3$
$2 + 2 = 4$	$4 - 2 = 2$
$1 + 3 = 4$	$4 - 3 = 1$
$4 + 1 = 5$	$5 - 1 = 4$
$3 + 2 = 5$	$5 - 2 = 3$
$2 + 3 = 5$	$5 - 3 = 2$
$1 + 4 = 5$	$5 - 4 = 1$

Nine consecutive pages are devoted to the development of the addition facts, *Primer* pages 57-65. As has already been explained, the first two of these pages approach addition through the study of component parts of the numbers 2 to 5. Then there follows a series of pages in which the idea of addition is suggested, first in three-picture sequences showing real situations (page 59), then in two-picture sequences (page 60), then in single action pictures (pages 61, 62, and 63). Only one page (page 64) deals with pictures of representative items. The addition facts which have been discovered in these several ways are then organized and systematized on page 65.

Similarly, the lessons on the subtraction facts are given nine pages, starting with an introduction through the study of component parts (*Primer* pages 67 and 68) and ending with the systematization of the facts on page 75.

What are your pupils to learn from these eighteen pages on the addition and subtraction facts through 5? Well, first of all,

thorough understanding of the meaning of all the facts. By this statement we mean (a) that they should understand the processes involved—addition (though the word "addition" is not used) as a process of combining parts, and subtraction (without the word "subtraction") as the process of separating a group and taking away a part, to find the other part; (b) that they should expect the process of addition as they work with numbers from 1 to 5 to yield a total larger than either of the two parts that are combined, and the process of subtraction to yield a part that is smaller than the initial whole; and (c) that they should be able to demonstrate their understanding as described above in dealing with both real and prearranged quantitative situations involving addition and subtraction with sums and minuends limited to 5. (The "demonstration" may call for the manipulation of objects, the drawing of pictures, dramatization and at times simple written records, as described above.)

Is anything more than understanding to be expected? Yes, we think so. We believe it not unreasonable for most, if not all, of your pupils by the end of the half year to have mastered the six addition and the six subtraction facts with sums and minuends limited to 4. Research has shown that many children know several of these facts before they enter the first grade. With the experiences they will have in the term, practically without an exception they should be able to carry learning through sums and minuends of 4 to the point of mastery—*intelligent* mastery, as explained above—before they move on into the second half year. Many will go further and learn the facts for 5; but there is no hurry. These facts, as well as those for 2, 3, and 4, are thoroughly retaught at the start of the second term, and all pupils will have ample opportunity to master these facts in due time.

In view of this recommendation we do not hesitate to recommend a limited amount of drill on the facts with sums and minuends through 4. The drill may take several forms but it may well include oral procedures in which you ask, "How many are three and one?" "two and two?" and so on.

Objective 12. This objective relates to the fractional idea, halves of objects. More than one investigation has shown that quite a few children at the beginning of Grade 1 have a fairly clear conception of halves of objects, while most know something about the concept. Some of the pupils may refer to "the larger" or "the smaller" half. While such expressions are mathematically inaccurate, their users are evidently aware that they are talking about one of two parts of an object. They need only to learn that the two parts must be equal in size if they are to be called "halves." You will have been using oral experiences in connection with this objective during the last period of instruction. Now *Primer* page 76 provides written experiences designed to teach that halves refer to two *equal* parts of objects. The method of expression used by the pupil is that of identifying parts that are halves by circling the correct pictures.

Objective 13, "ability to perform simple problem tasks by using real and representative materials," should continue to receive attention. (See *Teachers' Edition* page 74 for suggestions.)

Now come the suggestions and plans for teaching the *Primer* pages 55-80. *Primer* pages 78-80 provide general tests for this last period of instruction and should give an overall picture of your pupils' abilities at the end of the first half year of systematic instruction.

Teaching Primer Page 55

Pupil's Objective. To learn to identify situations in which certain measuring instruments can be used.

Background. As we have said before, the later teaching of precise measurement should be based on thorough grounding in measuring instruments and the situations to which they pertain. The exercises on *Primer* page 55 require selection of the situation from among three shown that lends itself to use of a specified instrument. Those on page 56 show a situation and require that the appropriate measuring instrument from a choice of several be identified.

Teacher's Preparation. Have available to the extent possible a small tape measure, an outdoor-type thermometer, a ruler, a calendar, some sort of scales, a measuring cup, measuring spoons, a bushel basket, a yardstick, a clock (or facsimile clockface), and a clinical thermometer.

Pre-book Lesson

1. Hold up a yardstick, ask for its name, and have someone tell what it is used for. Let someone else demonstrate its use, as laying the yardstick along the floor, and tell what information this use will provide. Introduce the word "measure"; the yardstick is something we use to "measure" how long or tall things are.

2. Proceed similarly with several other instruments. Lead the pupils to tell you that the cup "measures" liquid and dry ma-

terials; the thermometer "measures" heat (be sure that pupils understand about several kinds of thermometers besides the usual house thermometer; that is, the clinical thermometer, the cooking thermometer, and so on); the scales "measure" how heavy things are; and so on.

Book Lesson

1. First, examine the measuring instruments in the eight exercises, identifying each by name and by purpose. If the children are unfamiliar with any pictured instrument, show the real one you have and allow it to be examined. (The scales may be the only instrument on the page for which you cannot do this.) Then return to row 1.

2. For the first box say: **I am pointing to a picture of something; what is it? (A ruler) Which of the things below the ruler would I measure with the ruler? the electric bulb? (perhaps so; then why?) the water dripping from the faucet? or the board?** Get agreement that the ruler would most probably be used with the board, and have the children help Cappy circle the board.

The best answers in the succeeding exercises are: top right, "radiator"; row 2, at left, "girl eating breakfast" and, at right, "bottle of milk"; row 3, "sugar" and "garden hose"; row 4, "child" and "meat." But the children may have their own reasons for preferring other answers; hence, oral discussion is imperative.

3. Discuss the second exercise in the first row, allowing answers other than "the radiator" at first but requiring justification; then ending with agreement.

4. When your pupils know what to do, have them complete the page without help. Then return to the second row of exercises for oral work. In each exercise consider all answers whether correct or incorrect, but work toward agreement on the answers listed above as "best."

Differentiations and Extensions

1. Leave several of the measuring instruments on your number table or in its vicinity. Encourage the children to examine them and use them.

2. Have helpers work with individual *slower learners* at the number table. The helper selects a measuring instrument and then asks the *slower learner* to tell as many situations as he can in which the instrument can be used.

3. Have *all children* tell of situations they have seen at home when measuring was used.

4. Ask *more capable children* how they could measure the length of the room if no ruler or yardstick were available. (Answer: use a book, the length of a pupil's foot, or whatever.)

NOTES

55



Pupil's Objective. To learn to identify which measuring instruments to use in certain specified situations.

NOTES

Teacher's Preparation. Have available the same measuring instruments as used for *Primer* page 55 and others needed for this page.

Pre-book Lesson. If time has elapsed since the work on *Primer* page 55 was given, review with your pupils the names and uses of the several measuring instruments you have available in your room.

Book Lesson

1. First, examine the measuring instruments in the five rows of exercises on *Primer* page 56, identifying each by name and by purpose. If the children are unfamiliar with any pictured instrument, show the real one you have and allow it to be examined. (The speedometer, the gas pump, and the scales are probably the only ones on the page for which you cannot do this.)

Then return to row 1. Discuss the picture of the man sunning on the beach, and ask which of the things at the right could be used to measure something suggested by the picture. Some may think the ruler, in which case secure the reason. Pupils may think that the height of the man is to be measured. The picture is intended, however, to imply use of the thermometer. Try to elicit this suggestion. If it does not come, supply it, and ask why the thermometer would be used; that is, for what.

In the next four exercises, in order, the "best" answers are: "carpenter's rule," "measuring cup," "speedometer," and "bushel basket." In each case, however, other instruments might be used. If a child suggests another instrument, have him defend his choice. Then continue discussion until all have agreed on the best answer.

2. After a thorough discussion of the page as suggested above, have pupils return to row 1 and help Cappy circle the correct instrument to be used. Pupils will proceed similarly with circling the instruments in rows 2 to 5.

Differentiations and Extensions

1. Have *all children* start to measure with informal measuring units, such as erasers or books. They can find that the bulletin board is as long as six of their own books, and so on. This begins the development of the idea that we can select a unit to use in measuring.

2. Have *all children* find pictures of as many kinds of measuring instruments as they can.

56



Pupil's Objectives: (a) To learn to think of the numbers 2 through 5 in the component sense; (b) to discover the "parts" of these numbers; and (c) to learn to use "and" in stating the parts.

New Word: and

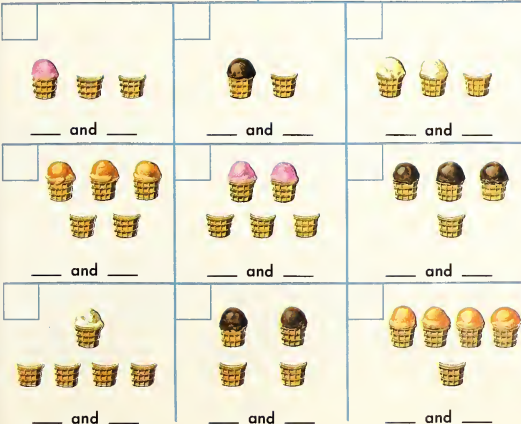
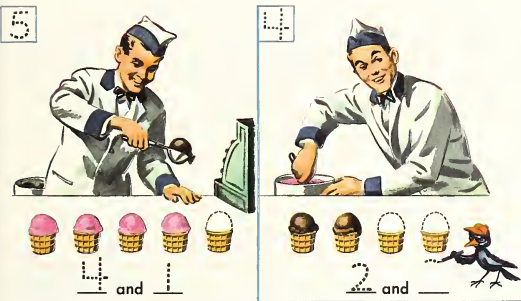
Background. Earlier in the *Primer* your pupils had experience in counting to find the additional objects needed to increase a group to make a designated group of larger size. They had such experiences on *Primer* pages 11-12 and 14-15 for the numbers 2 to 5; on pages 25 and 29 for the number 6; and, from then on, on one or more *Primer* pages for the numbers 7 to 10. True, on these pages they did not do precisely what they will do on *Primer* pages 57 and 58; nor did they concentrate on the discovered "parts" and write the record of their work. But the background they have had provides a sound basis for the present activities.

Pre-book Lesson

1. Seat four children at a table. Ask, **How many scissors will these children need?** In a little box on the chalkboard write "4." Then provide one of the children with scissors and ask some other child to give scissors to the three remaining pupils.

Make this record on the board saying, **First the children had one pair of scissors.** (Write 1 below the box.) **Then they were given three pairs of scissors.** (Write 3 to the right of the 1, inserting the word "and.") **Now are there as many scissors** (point to and read 1 and 3) **as there are children?** (Point to 4.) **Yes, and we read our story: Four has the parts one and three.**

57



If there is lack of understanding, repeat the whole activity showing that 4 has the parts 2 and 2 and that 4 has the parts 3 and 1. Make sure that the children can read the record, being able to recognize and use the new word "and." At this stage, set up the empty framework on the chalkboard and let a pupil fill it in—the box above for the total number and the blanks as, "___ and ___" under the box.

2. As needed, organize one or two more natural or pre-arranged situations. For example, line up five girls in front of the class and give three of them the special hats which *all* are to have. The final record is: 5 3 and 2 which is read, "Five has the parts three and two."

Book Lesson

1. The first row of two exercises and possibly the first one or two exercises in the second row are to be taken up orally with the class as a whole, in order to assure understanding of the activity called for and ability to write the numerical record. The work on this page deals with pictures of real objects.

Discuss the first picture asking: **In how many cups is the man putting the ice cream?** (5) (Pupils trace over 5 in the little box at the top of the picture.) **How many cups have ice cream in them?** (4) (They trace over the 4 that Cappy has made.) **How many cups need to be filled?** (1) **Now draw a dipper of ice cream in the cup where Cappy has made a dashed line.** When all have completed the drawing ask: **What are we to do now?** (Trace over the 1 that Cappy has made.) Next, **Who will read what all the writing tells?** Finally, having *derived* the parts of 5 (4 and 1) from the picture, ask: **How do we know that five has the parts four and one? What did we do to find out?** (We had four filled cups. Then we filled one more. The four cups and the one cup make five full cups; so, five has the parts four and one.)

2. Teach the second picture in the top row in about the same way, seeking however to put more responsibility on the children themselves to complete the record as they work. Check the work for accuracy and understanding, and have the children relate the abstract parts-story to the picture, as in the last of the preceding paragraph.

3. Give such help as is needed in the second row in order to get the children started correctly. Then let them complete the page themselves while you move about to inspect and to give assistance as required.

Differentiations and Extensions

1. If *slower learners* are having trouble, teach your helpers to give them "stick and finger" practice. Four sticks are put down and the pupil says "four." Then the helper puts 3 fingers on 3 sticks and the pupil says "three." Then the helper puts one finger on the remaining stick and the pupil says "and one." Then the pupil repeats "Four has the parts three and one."

2. Have *all children* take three small objects and see how many sets of parts they can find for 3. Have them do the same with 4 objects; with 5 objects.

3. Check some of the *more capable children* to see how many of the parts of 3, of 4, and of 5 they can give you, just using numerals. Also, note if any pupils recognize that a number can have more than 2 parts, for example, 4 2 and 1 and 1.

*Remember: When you see this symbol, watch for opportunities in the lesson to use the Ginn Arithmetic-Stick described on *Teachers' Edition* page 9.



Pupil's Objective. To continue the study of component parts of groups through 5 in the additive sense.

NOTES

Pre-book Lesson

1. On the chalkboard in a rectangle show 3 circles in all, 2 drawn in a solid red (or yellow or blue) line and 1 in a dashed white line. On the chalkboard set up the form of the little square box and under it "___ and ___."

Ask, **How many circles are there on the chalkboard?** (3) In the small square have someone record the "3." Then ask, **How many red circles?** Have him record the "2" in the first blank below the circles.

Have another pupil come to the chalkboard and trace over the dashed circle to make it a solid white line. Then ask, **How many white circles?** (1) Have him record the "1." Now another pupil will read the whole record "3 has the parts 2 and 1."

2. Repeat the chalkboard experience using 4 circles or triangles in all, shown as 1 yellow one and 3 dashed white ones. Do not show a spatial separation—the color will achieve the separation.

Book Lesson

1. Work the first exercise on the page orally with your pupils to make sure that they are ready to follow the technique you have been using in the Pre-book Lesson.

2. Let the pupils work independently the remaining exercises on the page, giving assistance as may be needed.

Differentiations and Extensions. You may have the *more capable children* prepare exercises like those on *Primer* page 58 with whole groups not larger than 5. These materials may then be used for extra practice by the *slower learners* and by *all pupils* who need more practice on this type of exercise.

Reminder. Provide experiences involving the comparison of group sizes and object sizes.

58

 3 and ___	 ___ and ___	 ___ and ___
 ___ and ___	 ___ and ___	 ___ and ___
 ___ and ___	 ___ and ___	 ___ and ___
 ___ and ___	 ___ and ___	 ___ and ___
 ___ and ___	 ___ and ___	 ___ and ___

Pupil's Objectives: (a) To learn about the process of combining sub-groups to make totals through 5, thus learning about addition and discovering the addition combinations through 5; and (b) to begin to write down the record with figures.

New Word: *dogs*

Background. In many experiences besides those on *Primer* pages 57 and 58, your pupils will have actually added or put groups together, though the activities have not been taught or recorded as addition facts. Here, for the first time, words record what is happening in each instance. These records take two forms: a record of the two parts as they are moving together and a record of the whole group after the parts are together.

Pre-book Lesson. The three-picture sequences on *Primer* page 59 are intended to reveal, as well as can be revealed by pictures, the process we know as addition. In each series, the first picture shows two separate groups of objects; the second illustrates the *act* of combining groups; the third shows the total thus achieved. The Pre-book Lesson should be organized in the same way, in three stages as it were.

1. Use a natural or a prearranged situation with two sub-groups of like-things, the total of which is no more than 5. To illustrate: let there be two chairs at a table and two more chairs at the wall; have the two at the wall brought to the table—the physical movement of carrying the two extra chairs to combine with the first two dramatizes the essential idea of addition and this is highly important; then have the children note and tell the

total of chairs together. Finally, have a child recall how many chairs were in each of the sub-groups before they were moved. Then, with the help of your children, write the record on the board: "2 chairs and 2 chairs" "4 chairs."

With the record on the board have the children translate in some way such as: "We had 2 chairs and 2 chairs. We put them together. Then we had 4 chairs together."

2. Repeat with other simple quantitative situations, each time writing the final record on the board, and having it translated back into the situation from which it was derived. Stress particularly (a) the idea of combining the two sub-groups as an active process, (b) the meaning of "and" to stand for this process, and (c) the fact that the final total is larger than either of the parts that have been "put together" (perhaps the best language expression for children, in place of "added" or some other less meaningful expression).

Book Lesson

1. Complete the first exercise orally with the children, supplying no more suggestions than may be necessary. Allow the children to complete the page as soon as they are able to do so.

2. Conclude with an oral period of discussion to check (a) accuracy and (b) understanding of the work. Do not neglect the step of having the children read the records back into the pictures.

Differentiations and Extensions. If helpers will work with *slower learners* and have them actually move small objects together, the feel of the moving together may help these pupils to get the adding concept.

NOTES

59

<u>2</u> dogs and <u>1</u> dog		<u>3</u> dogs
___ dogs and ___ dogs		___ dogs
___ dogs and ___ dog		___ dogs
___ dogs and ___ dogs		___ dogs

Pupil's Objectives: (a) To learn more about combining groups of objects; and so, (b) to move toward understanding of the addition facts with sums through 5.

New Words: *trucks, are*

Pre-book Lesson. Use prearranged situations somewhat as for *Primer* page 59 to illustrate the putting together of two sub-groups. However, this time in making the final record use first a full statement making use of the new word *are*,—as "2 chairs and 2 chairs are 4 chairs," and then the shortened form, "2 and 2 are 4."

Book Lesson. The picture sequences are here reduced from three sequences as on *Primer* page 59 to two sequences. The first of the three pictures used heretofore to establish the two sub-groups can be safely abandoned, for the sub-groups are clearly differentiable in the first of each of the two-picture sequences on *Primer* page 60.

1. Work through the first exercise orally with the class as a whole, asking the children to supply the needed data in the longer record-form.

2. Continue with oral discussion through the second exercise on the page. In order to keep vocabulary difficulties to a minimum, the names of the objects are not shown each time. However, let the pupil name the items of the sub-groups to be put together, just as he has been doing in the first exercise. For instance, in the second exercise, the pupil will say, "3 tractors and 1 tractor are 4 tractors," but his written record will show the shortened form, "3 and 1 are 4."

3. Now let your pupils do the written work on the page. Supervise the work and provide assistance as needed.

4. Conclude as usual with a brief period of oral discussion of the kind described for *Primer* page 59.

Differentiations and Extensions. After the written work is completed, have an oral discussion with *all children* of the right-hand pictures on *Primer* page 60. First bring out the parts that made up the 5 trucks (4 and 1), the 4 tractors (3 and 1), the 5 racers (2 and 3), and the 4 taxis (1 and 3). Then see if pupils can tell other parts that would make 4 and would make 5 when combined.

NOTES

60



4 trucks and 1 truck are 5 trucks.



3 and 1 are 4



___ and ___ are ___



___ and ___ are ___



Pupil's Objectives: (a) To learn more about combining groups of objects; and so, (b) to move toward understanding of the addition facts with sums through 5.

New Word: *children*

Book Lesson. On *Primer* page 61 only the middle one of the original three-picture sequences is used. The two sub-groups are still readily identifiable, and the process of addition is implied in the action shown. The total of the two sub-groups or parts is not, however, shown as a final group, and the children must furnish the numeral that stands for the total group as they complete the record.

With no modification, the teaching suggestions for *Primer* page 60 hold here. Because the picture situation has now been abbreviated, the pupil is helped in the first exercise again by seeing the full statement completed with dashed numerals. After the first exercise, the pupil has pictures to help him think the names of the sub-groups to be combined but his written record appears in the shortened form only.

Differentiations and Extensions

1. This is a good time to move *all children* another step toward abstraction through some oral work. Ask: **How many are there together if**

- 3 circus horses catch up with 2 circus horses?
- 1 clown jumps on a pile of 3 clowns?
- 2 dogs leap on a barrel that has 1 dog on it?

d. 4 clowns get into a funny car that is driven by another clown?

e. 2 monkeys get on a ladder and then 1 more joins them?

Sometimes you may want to use exercises like the above with an individual pupil and then ask the pupil how he gets his answers. It is important to find whether pupils visualize and then count, whether they hear the first numeral and then count on from that numeral, or whether they are actually recognizing the numeral that tells the total for the parts.

2. Have *more capable children* look through the basic and supplementary readers to find pictures that indicate adding through a total of 5. They can use these to give *slower learners* more practice.

3. Let your *more capable children* plan dramatizations for put-together stories to be acted out by them. The *slower learners* may be asked to tell the complete put-together story for each dramatization.

NOTES

61





Pupil's Objectives: (a) To learn more about combining groups of objects; and so, (b) to move toward understanding of the addition facts with sums through 5.

NOTES

New Word: *birds*

Book Lesson. Since the activities on this page are similar to those on *Primer* page 61, your experience will tell you what to do. Beginning with this page, the pace may be faster. Allow pupils to omit thinking and saying group labels. They may proceed at once to thinking the short statement—as for the bears—“2 and 2 are 4.”

Differentiations and Extensions. A vast amount of experience has revealed to the authors of this program that pupils can really make excellent progress in the learning of facts during the first half year. For that reason, they have made systematic provision for having the pupils get somewhere instead of just working a little with this and that. As *all children* work on *Primer* page 62 and the pages that follow, ask each one on several occasions to tell you how he got his answer. This will enable you better to guide the pupils' progress to real knowledge and considerable skill with the facts through sums of 5.

62



___ birds and ___ bird are ___ birds.

___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



Pupil's Objectives: (a) To have more practice on addition facts with sums as large as 5 as a secure base for skill with these facts; (b) to attempt two exercises that extend beyond 5.

New Word: *wagons*

Book Lesson

1. Except in the case of the last row, pupils should be able to proceed on their own,—thinking and writing the record in the shortened form.

2. The purpose of the last two exercises is to test understanding by seeing the degree to which the children can transfer the ideas and activities developed with sums of 2 through 5 to sums of 6 and 7. These exercises may be reserved for your *more capable children* (hence the heavy line above them) if you fear confusing *children of average ability* or the *slower learners*.

Record for Next Year. The space at the right is reserved for notations at this time when you are finishing the initial addition development with pictures of real objects. These notations should include additional activities that you want to use another year, techniques that have worked well in isolating the pupils' mental procedures, ideas you have developed for assuring real growth toward mastery, and so on.

63



___ wagons and ___ wagons are ___ wagons.

___ and ___ are ___.



___ and ___ are ___.

___ and ___ are ___.



___ and ___ are ___.

___ and ___ are ___.



___ and ___ are 5 6 7

___ and ___ are 5 6 7

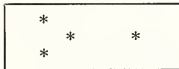


Pupil's Objectives: (a) To learn to *think* the combining of sub-groups of representative pictures that do not indicate a combining action; and (b) to write the put-together story.

Background. Up to now your pupils have been putting together groups of like-objects when that process has been clearly suggested or implied in a pictorial representation of real objects. The step to *thinking* the process (of combining) is another move toward complete abstractness. In the pictures of representative objects on this *Primer* page no action is shown, but with the background of previous experience your pupils should have no difficulty in thinking these sub-groups together.

Pre-book Lesson

1. Draw on the chalkboard a picture of representative items grouped as in the one at the right, with the incomplete statement beneath it. Ask: **Suppose we wanted to know how many stars in all are shown in this picture. What would we have to do?** Elicit the answer that we should have to think of the two groups, 3 and 1, as being put together. Then ask the children how we should make a record of what happens when we think of putting together 3 stars and 1 star (3 and 1 are 4).



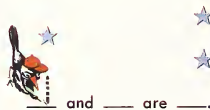
___ and ___ are ___.

NOTE: Although it would not be incorrect to have written "1 and 3 are 4," in the interest of consistency it is well at this time to write first the figure for the object or group at the left, then the figure for the object or group at the right. After all, children *read* from left to right.

2. If necessary, give experiences with groups of other representative objects. Sums should not exceed 5, of course.

Book Lesson. Use the first one or two exercises at the top of the page to further illustrate what has been done at the chalkboard. Then permit the children to work independently on the remaining exercises, giving help as needed.

Differentiations and Extensions. Have the *more capable* children make dot pictures in groupings similar to those on page 64 of the *Primer*, with the understanding that the groups when put together may not have a total of more than 5. Have the *slower learners* use these exercises for further practice like that on the *Primer* page.



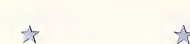
___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.



___ and ___ are ___.

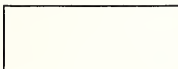
Pupil's Objectives: (a) To represent put-together stories with simple pupil drawings; and (b) to study these stories to find those that are related.

Background. Up to now, your pupils have not been asked to illustrate or draw put-together stories stated incompletely in abstract form. Nor have your pupils directed their attention to put-together stories that are related through a common property—equal sums. The material in this lesson will deal with both of these ideas.

Pre-book Lesson

1. Put a box and statement on the chalkboard, as at the right.

Ask: **How would you draw a simple picture with circles that will help you to find how much 2 and 1 are when put together?** Be certain that the drawing the pupils suggest clearly separates the group of 2 from the 1. Then complete the statement of fact.



2 and 1 are ____.

2. Use several similar examples on the chalkboard as needed. Do not permit sums to exceed 5, of course.

Book Lesson

1. Have the children help Cappy with the picture and written record at the top of the page, just as was done at the chalkboard previously. Then have the children work independently on the remaining exercises, giving help as needed.

65



1 and 1 are ____.

2 and 1 are ____.

1 and 2 are ____.

3 and 1 are ____.

2 and 2 are ____.

1 and 3 are ____.

4 and 1 are ____.

3 and 2 are ____.

2 and 3 are ____.

1 and 4 are ____.

2. After all children have finished work on this page, ask the following questions:

a. **Look at the put-together stories in the second row. How are they alike?** (In each one there are 3 all together—2 and 1 are 3 and 1 and 2 are 3.)

b. Similarly, bring out that in the third row there are 4 all together in each put-together story.

c. In the four boxes at the bottom of the page (last 2 rows), bring out that there are 5 all together in each of these put-together stories.

Differentiations and Extensions

1. If *slower learners* do not see the relationships among the facts, write "4" on the board in three different locations and draw boxes above each. Ask each of three pupils to put in a box 4 dots in all, divided into two sub-groups. Help each pupil so that no two boxes have the same sub-groups. Ask if all three situations have 4 in all. Then help children to write the put-together stories. Discuss how all stories result in the same total. If necessary, do this for totals of 3 and totals of 5.

2. See if *more capable children* can find other ways in which these sets of put-together stories are related. (Each story for 3 involves 2 and 1; two of the stories for 4 involve 3 and 1; two stories for 5 involve 4 and 1 and two involve 3 and 2; in each row, as 1 more is added in succeeding examples, each answer is 1 more, etc.)

Reminders

1. Are you paying attention to the ability to perform simple number tasks by using real and representative objects? On *Teachers' Edition* page 74, you will find a set of put-together "problems" or "simple number tasks" which you can use at this time.

Recall the purpose of providing experiences in dealing with number situations like those given. It is not to teach the number combinations, but to show that number is a normal part of living and that there are ways of meeting number needs. In problem 1 on page 74, your pupils can dramatize the situation and its solution: 4 children can be grouped, and another may be sent to join them. Or, the solution can be made by using some representative objects on the table top—a group of 4 objects of one kind, to which another is added. Note that the actual movement (whether of the child or of the object) to become part of a larger group *shows* the nature of addition. Hence, we advise *active manipulation* of some kind.

2. Remember also to provide experiences involving the comparison of group sizes and object sizes.

NOTES

Pupil's Objective. To review selected number abilities learned previously.

NOTES

Teacher's Preparation. Have available either real or "play" coins of the denominations cent, nickel, dime. Also have available the actual instruments for measuring that were suggested for use in connection with teaching *Primer* pages 55 and 56.

Pre-book Lesson

1. Make sure that, previous to their work on *Primer* page 66, the pupils discuss the uses of the actual measuring instruments you have made available for their examination and that they remember what purpose each instrument is intended for.
2. Use the game in which partners exchange coins of equivalent values. The *more capable child* probably should be paired with a *slower learner* and both children given a number of coins, real or "play" money. One pupil offers the other a coin for which he is to receive equal value in different coins.

Book Lesson

1. In the first exercise, have the children begin at the figure 1 and draw a line from dot to dot in serial order, ending at 10. Be certain to emphasize that the dots must be followed in the correct order. (The result will be a tree, of simple design.)
2. In each exercise with the coins, have the children draw a ring around as many coins at the right as are needed to be equal in value to the two coins shown at the left.
3. In the last three rows the child in each instance is to draw a ring around the object or thing for which the given measuring instrument can be used most appropriately. Best answers are: "desk top"; "salt"; "cheese." However, children may have their own reasons for preferring other answers, so oral discussion may be needed.

66

5

4 . 3 7 . 6

2 . 1 . 9 . 8

Pupil's Objectives: (a) To think further about the numbers 2 through 5 in the component sense; (b) to discover the "parts" of these numbers; and (c) to do so by thinking of the relationship of parts to the whole subtractively, that is, in a separating sense.

New Words: *in, all*

Background. *Primer* pages 67 and 68 are similar to *Primer* pages 57 and 58, the difference being that here the parts of groups are derived from the whole through separating totals into sub-groups instead of combining sub-groups. Your pupils will have had previous experiences which will stand them in good stead. True, they have not up until now separated totals as they will on these pages, but in numerous activities (for example, *Primer* pages 7, 13, 14, 17, and so on) they have eliminated extra objects from too large totals, in order to arrive at totals of indicated size; and this is a form of separating groups.

Teacher's Preparation. Read again the discussion of objective 10, page 103 of the *Teachers' Edition*, to get more clearly in mind the purposes of this study of parts and, more particularly, the approach through subtraction.

Pre-book Lesson

1. Send four children to the board and have them stand close together in line. Ask, **How many in all?** On the chalkboard make the record "4 in all."

Then put a chair between the second and third pupils so as to make the two sub-groups 2 and 2. Say: **Now let's put this on the board. After I placed the chair between Mary and Joe, do we have 2 and 2? Under "4 in all," we write "2 and 2."**

2. Repeat the dramatization with a group of three children standing at the board. After questioning the children, write on the chalkboard "3 in all."

This time draw a line on the board to separate the three children into a group of two children and a single child. After questioning the children, on the chalkboard under "3 in all" write "2 and 1."

For these Pre-book Lesson exercises, your pupils have (1) identified and recorded how many in all; (2) separated the whole group into two sub-groups; and (3) identified and recorded the size of each part. This is what they will continue to do on the *Primer* page.

Book Lesson. The two exercises in the first row (and possibly the first in the second row) are to be performed by the class as a whole, with accompanying oral discussion.

1. First exercise: Have the children tell how many pigs in all are shown, and blacken the dashed 4. Have someone read the whole expression: "4 in all," since *in* and *all* are new words. Call attention to the two small posts at the upper and lower edges of the box as well as to the dashed line connecting them. Have the children blacken this line, and see if they can then complete the statement of the parts, "3 and 1."

2. Proceed similarly with the second exercise and the third, providing less and less help. As soon as any pupil is ready to go ahead on his own, have him do so, eliminating him from the group who still need assistance.

3. Check the work on the page, and arrange an oral lesson in which, for each exercise, or as many as possible, the children tell what they have done and what they have found.

Differentiations and Extensions

1. *All children* can play "Guess the Parts." Have five children (or four, or whatever) stand at the chalkboard. Have each child write down two parts of 5 as his guess. You then draw a line between two sub-groups of the children and see how many pupils guessed these parts.

2. Have *more capable children* see if they can write all the parts of 2, of 3, of 4, and of 5.

3. Continue to work with individual children and have them tell you parts of numbers and how they arrived at the parts. You may find a few pupils who are getting to know the parts without resorting to counting or other procedures.

4. For your *slower learners* provide extra practice, using mimeographed materials modeled after the pictures on *Primer* page 67.

NOTES

67



4 in all
3 and 1



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



Pupil's Objective. To continue the study of the component parts of groups through 5 in the sense of thinking of the total group and then its separate parts.

Pre-book Lesson

1. Draw a picture of 4 squares in a pattern on the chalkboard, with 2 squares colored red and 2 squares yellow. Below the picture on the first line show "___ in all" and on the second line, "___ and ___."

Ask the children, **How many squares in all?** Have one child record the 4 in the appropriate blank.

Then ask: **How many are red? How many are yellow?** Then have the children complete the statement to read, "2 and 2."

2. Use several other similar illustrations as needed. Show groups in standard patterns, none to exceed 5.

Book Lesson

1. Use the first exercise as a sample. You may also want to discuss the second exercise with the class as this has no helping dotted figures.

2. Have the children work the remaining exercises independently, giving assistance as needed.

Differentiations and Extensions

1. Have some of the *more capable children* make dot pictures to show component parts, using the form of exercises shown on the *Primer* page. Then have the *slower learners* and the *average pupils* who need further practice use these pictures and finish the stories they tell.

2. You may want to let *all children* draw some two-color dot pictures with more than 5 dots in a picture. Then let them do some exploratory work finding the sizes of the parts.

68



5 in all
3 and 2



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___



___ in all
___ and ___

Pupil's Objectives: (a) To learn about the process of taking away one of the parts of a group and finding the other part, thus learning about subtraction and discovering the subtraction facts with minuends through 5; and (b) to learn how to make a record by using the words "take away."

New Words: *take, away*

Background. *Primer* pages 67 and 68, to say nothing of several other previous pages, have acquainted your pupils with the idea and the method of separating a group and taking away a part. The new elements here are the recording and the new reading words *take* and *away*. Note that, as a reverse of the first lesson on the addition facts (*Primer* page 59), the record here shows how many in the whole group, how many are taken away, and how many are left. In other words, these records show each time the whole group, the part taken away, and the part left. The word *is* is not introduced until *Primer* page 70.

Pre-book Lesson

1. Use or plan a situation which resembles, in the relationships involved, those in the three-picture sequences on *Primer* page 69. For example (you may prefer to use objects whose names are part of the pupil's reading vocabulary), put on your desk a pile of five large books (comparable in number to the birds in the first exercise). Have someone come to the chalkboard to write the numeral (5). (You yourself supply "books.") Then ask another child to take away two of the books (picture 2). Have still another child tell in his own words what has happened.

You yourself introduce the words *take away* if the pupil does not do so. Write the words on the board and let a pupil supply the "2" (you supply "books"). Next have the number left identified (picture 3) and the record completed as shown under the first series of pictures on *Primer* page 69.

2. Repeat the experience until the children are thoroughly familiar with the words *take away* as describing what is done and can tell the story using the words *take away*. Develop each experience by writing the record on the chalkboard.

3. In the Pre-book Lesson experiences it is particularly important to use situations in which the process of subtraction is clearly *apparent*. That is to say, the taking away of a part should be shown through action. Books may be *lifted* from a larger group; pencils may be *removed* from a box; some of the crayons on a table may be *put* into a container; objects on the board may be *erased*.

Book Lesson

1. Work through the first exercise with the class orally. Note that your pupils (1) write the numeral for the total group in the first picture, (2) identify and write the numeral for the part taken away, and (3) identify and write the numeral for the part left. In this way they complete the record beneath the pictures.

2. At the conclusion of the lesson, for each exercise have some child read his record and explain and justify, in terms of the pictures, what he has entered on the page.

Differentiations and Extensions

1. Difficulty may arise at two points. Some may not understand the pictured sequence as showing subtraction. In this case, make use of more natural or prearranged situations as described in the Pre-book Lesson. Also, sometimes a *slower learner* can get the idea if you pretend to push away or take away the departing birds in the middle picture of the first row. Then have him do this for the middle picture in each of the other three rows.

2. Some may not understand how to write the stories. In this case, write on the board a series of incomplete statements, like those under the picture sequences, using reading words with which the pupils are familiar, as, for example,

___ boys take away ___ boys ___ boys.

Put five boys in a group at the front of the room; tell three of them to go to their seats; and ask one of those needing help to complete the record on the board.

NOTES

69



5 birds take away 2 birds 3 birds



___ birds take away ___ birds ___ bird



___ birds take away ___ bird ___ bird



___ birds take away ___ birds ___ birds



Pupil's Objectives: (a) To advance to the point of recognizing in a two-picture sequence the taking away of one part of a group to find the other part; (b) to continue the discovery of the subtraction facts with minuends through 5; and (c) to learn how to complete the story, involving both the expression "take away" and the word "is."

New Words: *apples, is*

Pre-book Lesson. Use prearranged situations somewhat as for *Primer* page 69 to illustrate the taking away of part of the whole group. However, this time in making the final record, use first a full statement, making use of the new words *apples* and *is*,—as "4 apples take away 3 apples is 1 apple," and then the shortened form, "4 take away 3 is 1." Note how this procedure helps bring out that arithmetic is a language that tells a story about quantity just as our regular language tells a story about qualities, situations, and events.

Book Lesson. The first picture in the three-picture sequence is now eliminated. The former second picture is such as to permit the easy identification of the whole group at the same time that the act of removing part is shown.

1. Work through the first exercise with the class as a whole, asking the children to supply the needed data in the long-record and then the short-record forms.

2. Continue with oral discussion through the second exercise on the page. In order to keep vocabulary difficulties to a minimum, the names of the objects are not shown each time. However, let the pupil name the items of all the groups referred to, just as he has been doing in the first exercise. For instance, in the second exercise, the pupil will say, "5 bananas take away 4 bananas is 1 banana," but his written record will show the shortened form, "5 take away 4 is 1." Your pupils may be able to go at once to the shortened form.

3. Now leave your pupils to their own devices to finish the page. Supervise the work and provide assistance as necessary.

4. Again conclude the lesson by checking the work and have the children "read" their records back, the latter activity to insure understanding in place of mechanical performance.

Differentiations and Extensions

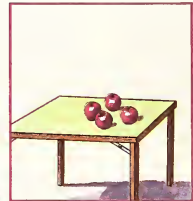
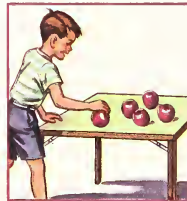
1. If *slower learners* have trouble with this page, you may want to mimeograph and use with them a work sheet showing two-picture sequences with apples and the longer statement (with blanks) each time as well as the shorter statement.

2. With a group of *more capable children*, try giving take-away situations orally to see if they can work them out when the objects cannot be seen. Then, if this is working well, try out some simple oral situations with *all children*.

Some situations might be

- 5 boxes take away 4 boxes
- 4 erasers take away 1 eraser
- 5 pencils take away 3 pencils
- 3 books take away 2 books
- 5 milk cartons take away 3 milk cartons
- 5 apples take away 2 apples

70



5 apples take away 1 apple is 4 apples.
5 take away 1 is 4



5 take away 4 is 1



3 take away 1 is 2



4 take away 1 is 3



5 take away 1 is 4



4 take away 1 is 3



5 take away 1 is 4



Pupil's Objectives: (a) To learn to recognize in a single picture the taking away of one part of a group to find the other part; and so, (b) to continue the discovery and recording of the subtraction facts with minuends through 5.

New Word: *hats*

Book Lesson. Note that, now, subtraction is shown in single-action pictures,—pictures similar to those that formerly were the middle pictures in the three-picture sequences.

1. It will probably suffice to help your pupils with the first exercise and with the first in the second row. With slight modification, the teaching suggestions for *Primer* page 70 hold here. The first exercise shows both the long and the short form of written record. As on *Primer* page 70, beyond the first exercise the pupil may think the names of the items in the whole group, and consequently those in the parts, or he may go at once to the shortened form.

2. Be sure to conduct an oral lesson when your pupils have completed the page. With but a single picture to carry the whole idea of subtraction, and with the necessity of discovering in this one picture the whole group, the part taken away, and the part left, it is particularly important to test understanding.

Differentiations and Extensions

1. If *slower learners* are having trouble on *Primer* page 71, first have them tell, then write, how many in all for each picture on the page. Then have them pretend to push away or take away one part and tell, then write, this part. Then have them tell,

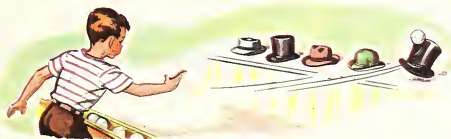
then write, the part that is left. This procedure helps develop the two very important aspects of first definitely sensing the total and then fully recognizing what is taken away.

2. As the *more capable children* finish *Primer* page 71, let groups of three plan dramatizations of take-away situations. As these situations are later enacted, let *slower learners* tell the complete take-away stories.

3. You may also want some groups of *more capable children* to dramatize take-away stories, as this provides maintenance for those who plan the stories and for those who give the statement. However, watch closely that the take-away dramatizations do not cause interference with developing the take-away concept.

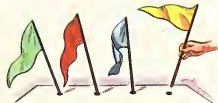
NOTES

71



___ hats take away ___ hat is ___ hats.

___ take away ___ is ___.



___ take away ___ is ___.



___ take away ___ is ___.



___ take away ___ is ___.



___ take away ___ is ___.



___ take away ___ is ___.



___ take away ___ is ___.



Pupil's Objectives: (a) To learn more about taking away one part of a group to find the other; and so, (b) to continue the discovery and recording of the subtraction facts with minuends through 5.

Pre-book Lesson. The pupils will enjoy very much the situations that the puppets get into on this page. Have pupils tell the story of each picture and, as they do so, be sure to note whether they use numerals instead of indefinite terms such as "some." Don't interrupt to have them change their expressions because you want them to enjoy the pictures at this point. However, here and elsewhere, be sensitive to whether your pupils are moving toward greater use of numerals for precise description rather than the less precise terms of "many," "few," and so on. We want to have pupils know these less definite terms that apply to quantity, but we must also guide them to use the more definite number terms when possible.

Book Lesson. Since the activities on this page are identical with those on *Primer* page 71, your experience will tell you what to do. Remember that it is good pedagogy to have the children do all they can without help from you.

Differentiations and Extensions

1. Many children now have hand puppets. You may want to have committees work out little dramatizations with these hand puppets to show put-together and take-away situations, providing you have found that your pupils can deal with both ideas now in demonstration situations.

2. A harder application of the take-away idea is to apply it in remembered situations. Ask each of the *more capable children* to try to remember a take-away situation and to tell that situation to the class. You may want them to confine the remembered situations to the classroom so that you can verify both the situation and the accuracy of the remembered numbers.

72



— take away — is —



— take away — is —



— take away — is —



— take away — is —



— take away — is —



— take away — is —



— take away — is —



— take away — is —

Pupil's Objectives: (a) To think subtractively in situations that are not obviously subtractive; and at the same time (b) to continue the discovery and recording of the subtraction facts with minuends through 5.

Background. Occasionally someone feels that crossing out objects in pictures does not clearly represent subtraction. The authors of this program have found from experience that crossing out objects is a very important aspect of the development of the subtraction concept because this activity moves the pupil upward on the abstraction scale. That is, the pupil now begins to sense that subtraction applies even where objects aren't actually removed—but the use of X enables the pupil to continue to have kinesthetic and visual experiences akin to his previously developed feeling for subtraction.

Pre-book Lesson. Use chalkboard experiences to prepare your pupils for the new angle to the exercises used on *Primer* page 73. The pupils are *told* what is taken away. They perform the taking away by crossing out the correct number of items. They then complete the statement about the taking away.

1. Draw on the chalkboard 4 balls. Explain that now we shall take away by crossing out the correct number of balls. Call on a pupil to come to the chalkboard and take away 1 ball. When he has performed the taking away, write below the picture the statement “ take away is .” and let another pupil complete the record.

2. Repeat the chalkboard experiences until you feel that your pupils are familiar with the new activity.

Book Lesson

1. Discuss the first picture (four bees flying around a hive), and have someone read the direction line “Take away 1.” To show the “taking away,” one of the bees has been crossed out with a dashed X. Have your pupils blacken over the dashed X and complete the written record. Have them then turn the pictured episode into an imagined happening: “Four bees were flying around a hive, and one of them flew away. Then there were only three bees near the hive. So, the number story is, *four take away one is three.*”

2. Continue similarly with the second exercise, and also with the third if necessary. By this time your pupils—or at least most of them—will be able to finish the page themselves.

3. Note that the last two exercises below the heavy line involve minuends of 7 and 6, respectively, and are, therefore, beyond the limit of subtraction facts set for specific study in this term. The purpose is to test ability to transfer what has been learned to number situations which have not been subjected to study. Some special instruction will be needed so that the pupils will know that they are to choose from the three given numerals and circle the one showing how many in all. Reserve these two exercises for your *more capable children* if you think that these exercises may confuse the others.

4. Conclude the lesson, whether for the full page or for the first four rows only, with an oral discussion as usual, to check both accuracy of work and understanding. If your *more capable children* alone have tried the last two exercises, they will enjoy telling the rest of the class what they have done.

73

Differentiations and Extensions

1. You may want to direct *more capable children* to write on a separate piece of paper the take-away stories if 2 more are taken away from the bee picture, the grasshopper picture, the beetle picture, and the ant picture. Have them do these exercises without actually crossing out.

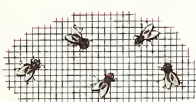
2. As you have time, use *Pattern Number Cards* to check the speed with which your pupils recognize patterns and also, through their oral reports, to find if they are recognizing patterns immediately or, instead, if they are adding sub-groups.

NOTES



Take away 1.

 4 take away 1 is



Take away 3.

 5 take away 3 is



Take away 2.

 take away is



Take away 2.

 take away is



Take away 2.

 take away is



Take away 1.

 take away is



Take away 3.

5 6 7 take away is



Take away 4.

6 7 8 take away is



Pupil's Objective. To continue the study of take-away stories for groups through 5 when representative pictures are used.

Background. This extends the work of *Primer* page 73 and the use of the crossing-out technique, but with two modifications: the representative pictures are used, and the pupil does not have the kinesthetic help provided by actually crossing out a prescribed number of items.

Pre-book Lesson. Use chalkboard experiences similar to those suggested for *Primer* page 73, but this time instead of directing the pupil to take away a certain number of items, show the taking away by crossed-out items. Ask a pupil to tell the story and another one to fill in the blanks in the uncompleted statement you have placed below the picture,

— take away — is —.

Book Lesson

1. Use the first two exercises at the top of the page for illustrative purposes. Ask the following questions, changing as necessary:

How many triangles are there in all?

How many triangles are taken away (crossed out)?

How many triangles are left?

What is the take-away story? Complete the story by putting in the numerals.

2. Now permit the children to work independently the remaining exercises on this page. Give assistance as needed.

Differentiations and Extensions

1. If *slower learners* are having trouble, let them first write the total number of items in each picture before proceeding.

2. The *more capable children* may draw representative pictures for take-away stories for groups no larger than 5. Have the *slower learners* and any other children who need further practice use these exercises.

3. This is a good opportunity to check the progress of individual pupils toward mastery of facts through 5. Mimeograph three or four exercises similar to those on *Primer* page 74. When opportunities permit, work with each pupil separately. First have the pupil write all the totals. Then, for each exercise, cover the crossed out items and see if the pupil can finish the exercise when he can't see the items that are taken away. Try to get pupils to "think" out loud as they are getting the answers. This will enable you to find those pupils who are able to tell the missing part immediately and those who are using less mature procedures such as counting and partial counting.

74



— take away — is —.



— take away — is —.



— take away — is —.



— take away — is —.



— take away — is —.



— take away — is —.



— take away — is —.



— take away — is —.



— take away — is —.



— take away — is —.



Pupil's Objectives: (a) To reproduce with representative pictures take-away stories stated initially in abstract form; and (b) to see related take-away stories in an organized way.

Pre-book Lesson

1. Put on the chalkboard the box and incomplete statement shown at the right.



3 take away 1 is ____.

Assist the children in making a dot picture to help find the answer: First draw dots to represent the whole group, 3. Then cross out 1 of the dots to show that 1 is taken away. Then have pupils tell you what is left.

Finish the take-away story by writing "2" in the blank space.

2. Use several other examples of a similar nature, as needed.

Book Lesson


1. Use the example at the top of the page for illustrative purposes in the same manner as the work was done at the chalkboard.

2. Then have the children work independently on the remaining exercises. Give assistance as needed.

3. After all children have finished this page, have them look at the two take-away stories in the second row. Ask how these stories are alike, leading to the idea that "in each story, we take away from 3" (or some similar expression the child may use).

In a similar way emphasize the similarity of the three take-away stories in the third row, and the similarity of the four take-away stories in the last two rows at the bottom of the page.

75



2 take away 1 is ____.

--	--

3 take away 1 is ____ 3 take away 2 is ____.

--	--

4 take away 1 is ____ 4 take away 2 is ____ 4 take away 3 is ____.

--	--

5 take away 1 is ____ 5 take away 2 is ____.

--	--

5 take away 3 is ____ 5 take away 4 is ____.

--	--

Differentiations and Extensions

1. If *slower learners* do not see the relationships among the facts, write 4 on the board in three different locations and draw boxes above each. Ask each of 3 pupils to put 4 dots in a box. Then ask the children if the three situations are alike. Then have children cross off 1 dot, 2 dots, and 3 dots respectively in the three boxes and finish the written take-away stories. Then discuss how all evolved from the same kind of situation. If necessary, do this for groups of 3 and groups of 5.

2. See if *more capable children* can find other ways in which these sets of take-away stories are related. (Each story for 3 involves 1 and 2; two of the stories for 4 involve 1 and 3; two stories for 5 involve 1 and 4 and two involve 2 and 3; in each row, as 1 more is taken away in succeeding examples, each answer becomes 1 less, etc.)

Reminders

1. Are you paying attention to the ability to perform simple number tasks by using real and representative objects? On *Teachers' Edition* page 74 you will find a set of take-away "problems" or "simple number tasks" which you can use at this time.

Recall the purpose of providing experiences in dealing with number situations like those given. It is not "to teach the number combinations," but to show that number is a normal part of living and that there are ways of meeting number needs. In problem 1 on page 74 your pupils can dramatize the situation and its solution: 3 children can be grouped and then 1 of them asked to "crawl through a hole" to his seat. Or the solution can be made by using some representative objects on the table top—a group of 3 objects of one kind from which 1 object is withdrawn. Note that the actual movement (whether of the child or the object) of part of the group away from the whole group shows the nature of subtraction. Hence we advise *active manipulation* of some kind in connection with all "problems" your pupils solve at this time.

2. Remember also to provide experiences involving the comparison of group sizes and object sizes.

NOTES

Pupil's Objective. To learn to identify halves of single objects.

NOTES

Background. As explained in the discussion of objective 12 (*Teachers' Edition* page 104) probably most of your pupils will already have pretty accurate ideas concerning the meaning of halves. To find out the extent to which this statement is true in the case of your class, supply each child with a small sheet of paper and ask him to tear it in halves. See what each does. Even if many of them should prove unable to do so, you have a good introduction for the *Primer Book Lesson*.

Teacher's Preparation. Paste three pictures on paper of the same size. Cut one into halves, one into two unequal parts, and the third into three equal parts.

In similar fashion divide three sticks of candy, one into halves, one into two unequal parts, and the third into four unequal parts.

Other objects may be substituted, but they must be such that the divided parts can be directly compared (matched in the case of halves) as evidence of equality or inequality.

Pre-book Lesson

1. Lay the sets of paper fractions you have prepared on a table where they may be seen by all the children or on a flannel board, separating each set of parts some distance from the other sets. Ask a child to hand you half of a picture. Do not tell him whether he has made a correct choice or not, but have him "prove" his choice and then subject his statement to group criticism. Have another child make a choice, and discuss it as before. Bring out the fact that, to have halves, the parts must be (1) two in number and (2) they must be of equal size. Show that the equality of the halves may be tested by laying one half on top of the other.

2. Repeat with the divided candy sticks.

Book Lesson

1. The first four exercises are for oral instruction. In the first, have the children tell why Cappy is drawing a dashed circle around the two pieces of watermelon and have them defend their answers. Have them then finish and blacken in Cappy's circle.

2. In the second exercise, have the children tell which picture shows halves and why. They can then circle the correct picture.

3. The situations in the second row are more complicated. Proceed about as for the first two exercises, having the children encircle in each exercise the one picture which shows halves.

4. The remaining exercises should be self-administering as they are simpler than the ones pupils have done under your guidance. The pupil has only to consider each separate picture and then encircle any that shows halves.

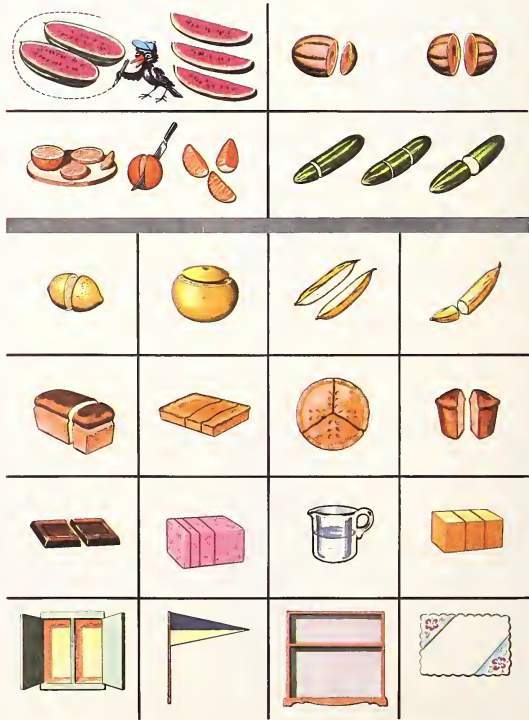
5. Conclude with the usual oral check lesson.

Differentiations and Extensions

1. If some of your pupils show by their work that they do not understand halves, organize them into a group and go back to experiences with real objects as described in the Pre-book Lesson. Then provide them (or all the children) with mimeographed sheets of pictured objects, some divided into halves, some not. For this purpose you may use representative pictures such as squares, triangles, circles, and ovals.

2. For more capable children, draw some figures showing halves that are harder to discern, such as a rectangle with a line from one corner to the diagonally opposite one, a circle with a wavy line separating its two halves, and so on.

76



Pupil's Objectives: (a) To identify number stories related to oral problem situations; and (b) to complete the number stories involved.

Pre-book Lesson

1. Place on the chalkboard where all can see them the following incomplete mixed put-together and take-away stories:

- | | |
|------------------------|------------------------|
| 1 and 4 are ____. | 5 take away 2 is ____. |
| 4 take away 2 is ____. | 4 and 1 are ____. |
| 5 take away 4 is ____. | 3 and 2 are ____. |

2. Read aloud the first of the following problems and ask, **Who can find on the chalkboard the story that goes with this problem?** Ask the first one who finds the story to come to the board and point to it. Then have him choose someone to come to the board and finish the story. Do the same with problem b, problem c, problem d, and problem e.

- Mr. Hicks had 4 big trees on his lawn. He cut down 2 of them. How many big trees did he leave standing?
- Pete has 1 marble in one pocket and 4 more in another pocket. How many marbles has he in all?
- Mother bought 4 large electric bulbs and 1 smaller one. How many electric bulbs did she buy?
- The store man had 5 big pumpkins. He sold 2 of them. How many pumpkins did he have left to sell?
- Mother had 5 apples on the table. She used 4 of them to make a pie. How many apples were left?

Book Lesson

1. Have the children look at the box with the bird perched at the top. Call attention to the fact that there are three incomplete number stories in this box.

2. Say to the children: **I am going to read a problem to you. Listen carefully! Tommy had three marbles. He found another marble. How many marbles did Tommy have then?**

a. Now ask: **Which number story in the box tells you about Tommy's marbles?** Give whatever help is necessary to have children see that the first number story in the box is the correct one.

b. Now say: **Finish the number story about Tommy's marbles. Listen again while I read the problem to you. You may use your counters or you may draw a picture to help you find the answer if you need to.** Check to be certain the children have placed the numeral 4 in the blank space in the first number story in this box.

3. Now say to the children: **I am going to read another problem to you. In the same box you are to find the number story that tells about this problem and then you are to finish it. Now listen carefully to this problem. Alice had one dress for her doll. Her mother made four more dresses for Alice's doll. How many dresses did Alice have all together for her doll?** Help the children to select the last number story in this box and to write the numeral 5 in the blank space to complete the story.

4. Proceed in like manner throughout the rest of the page. In the case of each box, two problems are to be read in turn to the children. After each problem is read, children are first of all to decide which number story in the box is the appropriate one, and then are to finish the number story. The oral problems to be used with each of the boxes are indicated below.

a. "Cat" box:

- Jack had 2 toy cars. He bought 3 more toy cars. How many toy cars did he then have in all?
- Ann had 5 lollipops. She gave 2 of them to her sister. How many lollipops did Ann have then?

b. "Dog" box:

- Bill had 5 baseball pennants. He lost 1 of them. How many pennants did Bill have left?
- Sue had 1 green comb and 2 red combs. How many combs did Sue have in all?

c. "Pig" box:

- Edith had 4 books on a shelf. She put one more book on the shelf. How many books were on the shelf then?
- Albert had 4 books on a shelf. He took one of the books off the shelf to read. How many books were on the shelf then?

d. "Cow" box:

- Tom had 3 planes. He broke 2 of them. How many good planes did Tom have left?
- Ann had 3 jacks and Sue gave her 2 jacks. How many jacks did Ann have then?

e. "Horse" box:

- Dick had one apple in each hand. How many apples did Dick have all together?
- Betsy had 4 bananas. She gave 2 of them to a monkey at the zoo. How many bananas did Betsy have left?

77

 3 and 1 are ____.	 5 take away 2 is ____.
4 take away 3 is ____.	2 and 1 are ____.
1 and 4 are ____.	2 and 3 are ____.
 5 take away 4 is ____.	 1 and 3 are ____.
5 take away 1 is ____.	4 take away 1 is ____.
1 and 2 are ____.	4 and 1 are ____.
 3 take away 2 is ____.	 2 and 2 are ____.
3 and 2 are ____.	4 take away 2 is ____.
5 take away 3 is ____.	1 and 1 are ____.

Pupil's Objective. To show how well certain number abilities have been acquired.

Background. With the exception of the row of tents, the work on this page is self-administering after you briefly recall to the pupils what is to be done. All activities are familiar ones.

Book Lesson

1. Indicate what is expected in the first exercise (to start at 7 and draw the right path to get to the treasure at 10); and in the last exercise (in each box to form a group of the indicated size, using whatever method is necessary). Have them wait to do the work.

2. Now refer the children to the row of tents. Ask them to

- put an X on the second tent;
- draw a ring around the fifth tent;
- put a simple flag on top of the first tent;
- blacken the fourth tent.

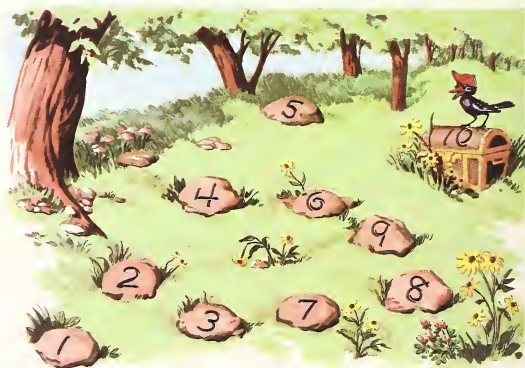
3. Now have children complete the first and last activities independently.

4. Note the names of any children who are deficient or questionable in their ability with

- Serial order to 10;
- Ordinals to fifth;
- Reproduction of groups as large as 10.

Differentiations and Extensions. For work on sequence, have a treasure hunt in the room. Write the numerals 1 to 10 on pieces of cardboard and have them located in places in the room so that the succeeding numeral is not visible when a child is standing at the location of any specific numeral. Have each *slower learner* try to follow the trail accompanied by a helper. The helper checks to see that the *slower learner* goes in correct sequence. A variation is to reverse the trail finder and the checker the first time because the skill of remembering 2 while hunting for 3 is somewhat difficult and may need to be done by the helper first. This gives the *slower learner* two practices with the number series.

78



9	8	10

Teaching Primer Page 79 (Test)

Pupil's Objective. To show how well certain number abilities have been acquired.

Book Lesson

1. Be certain the children understand what is to be done in each row of the test; then permit them to work independently.

In rows 1 and 2, circle in the right-hand box the coins whose value would equal that of the coins shown in the left-hand box.

In row 3, circle the clock in the right-hand box which shows the same time as that shown on the clock in the left-hand box.

In row 4, circle the measuring instrument most appropriate for measuring the weight of the grapes.

In row 5, circle the thing which shows the same kind of parts (halves) as the pie in the left-hand box has.

2. Note the names of any children who are deficient or questionable in their ability with

- a. Coins (Ex. 1 and 2);
- b. Time (Ex. 3);
- c. Measurement: weight, length, and temperature (Ex. 4);
- d. One half of an object (Ex. 5).





















Differentiations and Extensions

1. While no specific training has been provided in measuring with a foot ruler, you may want to check individual pupils to see which ones are able to

- a. Find a distance of 7 inches and of 2 feet as marked off on a cardboard sheet by you;
- b. Draw a line of 4 inches and one of 1 foot.

NOTES

79

Pupil's Objective. To determine which addition and subtraction facts can be recalled without the aid of pictorial representations.

Background. This is a special test of each child's ability to work with the addition and subtraction facts through sums and minuends of 5. In all work in the *Primer* these facts have always been related to some form of pictorial representation. Here we wish to see to what extent children may have developed the ability to recall sums and remainders without the aid of such representations. It is not expected that all children will meet with a high degree of success on this special test page. However, it would not be sensible to end the work in this *Primer* without finding which pupils have attained competence with abstract facts to 4 and which to 5.

Book Lesson

1. Tell the children that in the first column there are some put-together stories for them to finish, and in the second column there are some take-away stories to finish. Then tell them that before Cappy flies away he would like to see if they can finish some stories without using pictures or drawings. Ask them to do the best they can, and not to become discouraged if there are some stories they do not remember or cannot work "in their heads."

2. Then permit the children to work independently, but do not provide special help.

3. You may want to close the work in this book by calling attention to Cappy's bowing good-by and flying away. You can tell the children that Cappy has been helping them up to now and has had a lot of fun with them. Now he feels that they have grown up a lot in number work and, while he would like to stay, he feels they should now do more of the work by themselves.

Differentiations and Extensions. This page provides a splendid opportunity for you to find the levels of maturity of thinking within your class. Work with individuals and have each think aloud as he finds the answers to selected examples on *Primer* page 80. Some pupils will find it difficult to verbalize their thought procedures. Don't be discouraged because at least this provides an opportunity for these pupils to develop the skill of reporting their thinking. It is highly important for pupils to develop this skill because you need to know how they are doing the work in order adequately to guide their arithmetic development.

80

3 and 1 are ____.

2 and 2 are ____.

1 and 4 are ____.

2 and 1 are ____.

3 and 1 are ____.

3 and 2 are ____.

1 and 3 are ____.

4 and 1 are ____.

1 and 1 are ____.

1 and 2 are ____.

4 take away 1 is ____.

3 take away 2 is ____.

5 take away 2 is ____.

2 take away 1 is ____.

5 take away 3 is ____.

4 take away 2 is ____.

5 take away 1 is ____.

4 take away 3 is ____.

3 take away 1 is ____.

5 take away 4 is ____.



TEACHING BOOK ONE

The Program for the Second Half Year

THE PROGRAM FOR THE SECOND HALF YEAR

At this time, you may wish to review the theory underlying our program—our conception of arithmetic and our views concerning good teaching, economical and interested learning, and appropriate materials of instruction as spelled out on pages 1-10 of this *Teachers' Edition* for NUMBERS WE NEED, *Primer* and *Book One*.

As you read now the list of learning objectives for the second half year listed on *Teachers' Edition* page 133, note these two important points:

1. The objectives are for the second half year of systematic instruction as a whole and not just those for which *Book One* provides experiences. In the first place, an objective like "The ability to use understandingly words for comparison of sizes and positions and many quantitative terms . . ." can be developed more fully through using materials and activities in the classroom over and above the experiences with pictures in a work-text. In the second place, a program to be complete must extend, through oral experiences with real and representative objects, beyond the limits of the work-text. These concrete experiences help the pupil to meet his present needs and also aid in stimulating readiness for the more abstract presentations of the extensions in later work-text pages. Accordingly, from time to time, in connection with Extensions suggested for a *Book One* page, you will be reminded to make use of supplementary oral activities or, in Looking-Ahead activities, to prepare for written experiences to come later in the program.

2. Although the items in the list are referred to as *learning objectives*, keep in mind that some pupils will not be able to achieve these goals in the half year. Thus, you must interpret these objectives broadly and flexibly as you guide individual pupils in their number work.

In *Book One* the authors have provided a carefully differentiated program of instruction relative to the teaching and learning of the basic addition and subtraction facts. It is important that you understand this differentiated program clearly before you begin to use *Book One*, and that you then pace your subsequent instruction accordingly.

The minimum program of instruction is covered in the pages 1-82 of *Book One*. This material provides ample experience and practice with the addition and subtraction facts having sums and minuends as large as 6; and also includes development of generalizations for the addition facts through sums of 10 when 1 is added to a number and for the subtraction facts through minuends of 10 when 1 is subtracted from a number.

The last pages of instruction in *Book One* are optional and provide experience and practice with the addition and subtraction facts having sums and minuends of 7. This work is organized chiefly on the basis of component parts and the whole stories.

Special Looking-Ahead sections and some suggestions on *Teachers' Edition* page 252 outline plans for extending the work with the addition and subtraction facts through sums and minuends of 8, 9, and 10 on an oral and manipulative basis. This will furnish an optimum developmental program because pupils will then acquire thorough readiness which leads directly into the written experiences provided in NUMBERS WE NEED, *Book Two*.

As you can see, it is important for you to decide which children in your class will be served best by each of these three levels of work on the basic facts. Accordingly, on the basis of this decision, you will need to pace your program of instruction carefully for each group of children.

Learning Objectives for the Second Half Year of Systematic Instruction

1. Ability to use understandingly words for comparison of sizes and positions, and many common quantitative terms other than numbers*
2. Ability to read and write numerals to 100
3. Ability to read number words to *twelve*
4. Ability to count by rote and use enumeration (rational counting) to identify and reproduce groups
orally by 1's to 100; by 2's to 20; by 10's to 100; by 5's to 50*
with written experiences by 1's to 100; by 2's to 20; by 10's to 100
5. Understanding of the serial order and relative sizes of numbers to 100*
6. Ability to recognize at a glance the size of regularly patterned groups as large as 10
7. Understanding of and ability to use ordinals
orally through *twelfth**
with written experiences through *seventh*
8. Understanding of the structural meaning of numbers in terms of the decimal (tens) base of our number system, coupled with the principle of place value in our notational system
orally through 200*
with written experiences to 100
9. Understanding of coins commonly used, their relative values, and values of coin combinations
orally, the quarter*
with written experiences, the cent, nickel, dime, and ¢ sign
10. Ability to tell (identify) and show (reproduce) time on a clockface
orally, half past the hour*
with written experiences, on the hour
11. Ability to recognize common measuring instruments and occasions for their use
12. Ability to recognize objects cut into equal parts and to identify one of the equal parts by its appropriate name or size
orally, halves and fourths; one half and one fourth*
with written experiences, halves and one half
13. Knowledge of the circle and the square as geometric forms
14. Understanding of groups and numbers as large as 6 (optionally to 7) in terms of their component parts in order to state the "parts" story in two ways
15. Understanding of the dynamics of combining and separating, with intelligent control and mastery over addition and subtraction facts through sums and minuends of 6 (optionally to 7)
16. Ability to read and write addition and subtraction facts through sums and minuends of 6 (optionally to 7) in abstract form horizontally and vertically, using appropriate operational symbols
17. Understanding of the relationship through sums and minuends of 6 (optionally to 7) that permits most addition

*Starred items indicate objectives specifying content not covered entirely in *Book One* pages, either (1) because the content does not lend itself to experiences with printed material or (2) because the experiences with manipulative materials are suggested for oral development to serve as readiness for later written experiences.

- facts and most subtraction facts to be written in related pairs
18. Understanding of the relationship that permits pairs of addition facts through sums and minuends of 6 (optionally to 7) to be written with related pairs of subtraction facts to form "whole stories"
 19. Ability to combine 3 groups and to read and write (horizontally and vertically) number stories involving 3 addends with sums through 6
 20. Understanding of the relationships involved when 1 is added to a number and when 1 is subtracted from a number (sums and minuends to 10)
 21. Ability to deal with simple problem situations involving combining and separating
 22. Working with equal groups as readiness for the ultimate systematic study of multiplication and of division*
 23. Disposition to use, and the habit of using, number in practical ways*
 24. Possession of desirable emotionalized responses with respect to arithmetic—favorable attitudes, appreciations, and values*

The Nature of the Objectives

The objectives listed above indicate the general direction of the instruction during the second half year. These objectives are made more specific in the introductory material that precedes the work of each of the four periods of instruction. Further, in the period introductions, you will find each objective discussed. The discussions at those points will better serve your needs than if we were to elaborate on the objectives now. However, if you would like to explore the objectives more at this time, turn to *Teachers' Edition* pages 136–140, 168–170, 199–201, and 222–223.

1. First, note the words "Second Half Year" in the title preceding the list of objectives above. The half year in question could conceivably be the first term of Grade 1 or it might be the second term of Grade 1 or even the first term in Grade 2. However, the program, including *Book One*, is well within the abilities of children in the second half of the first grade, and it is recommended for use at that time.

2. Note, second, the words "Systematic Instruction." Now, systematic instruction does not mean *formal* instruction. The latter adjective carries implications of an undesirable kind—strict, rigid, overly serious, inflexible, even downright unpleasant. On the other hand, *systematic* instruction means that you have a job to do and you make plans to do it; but you can have a good time in the process, and so can your pupils. Systematic instruction can and should be informal in the sense that children enjoy learning what they are expected to learn.

Schedule of Instruction

The work of the second half year has been divided into four periods of instruction, each period lasting from two to five weeks. The following chart indicates the general schedule of instruction. The objectives for the half year listed above are here expanded in order to give recognition to certain distinctions in the objectives. The four columns represent the four periods into which the half year has been divided.

OBJECTIVES FOR THE SECOND HALF YEAR

	1st Period	2d Period	3d Period	4th Period
Ability to use understanding words for comparison of sizes and positions, and many common quantitative terms other than numbers	[O] maintain and strengthen	[O] maintain and strengthen	[O] and [W] maintain and strengthen	[O] and [W] maintain and strengthen
Ability to read and write numerals	[W] through 30	[W] through 60	[W] through 100	[W] maintain and strengthen
Ability to read number words	[W] through ten	[W] through twelve	[W] maintain and strengthen	[W] maintain and strengthen
Ability to count by rote	[O] maintain and strengthen to 50	[O] to 80	[O] to 100	[O] maintain and strengthen
Ability to use enumeration (rational counting) to identify and reproduce groups	[O] maintain and strengthen to 50	[O] to 80	[O] to 100	[O] maintain and strengthen
Understanding of the serial order and relative sizes of numbers	[O] through 50 [W] through 30	[O] through 80 [W] through 60	[O] through 100 [W] through 100	[O] and [W] maintain and strengthen
Ability to recognize at a glance the size of regularly patterned groups as large as 10	[W] maintain and strengthen	[W] maintain and strengthen	[W] maintain and strengthen	[W] maintain and strengthen
Understanding of and ability to use ordinals	[O] through tenth [W] through fifth	[O] through tenth [W] through sixth	[O] through tenth [W] through seventh	[O] through twelfth [W] through seventh
Understanding of the structural meaning of numbers in terms of the decimal (tens) base of our number system, coupled with the notational principle of place value	[O] and [W] through 30	[O] and [W] through 60	[O] and [W] to 100	[O] to 200 [W] maintain to 100
Ability to count by rote and to enumerate (count rationally) by multiples	[O] and [W] by 2's to 20 [O] by 10's to 100	[O] and [W] maintain and strengthen	[O] and [W] by 2's to 20 and by 10's to 100 [O] by 5's to 50	[O] and [W] maintain and strengthen
Understanding of coins commonly used, their relative values, and the values of coin combinations	[O] cent, nickel, dime, and $\frac{1}{2}$ sign	[O] and [W] maintain and strengthen	[O] and [W] maintain, strengthen, and extend through written experiences	[W] maintain and strengthen through dime [O] include the quarter
Ability to tell (identify) and show (reproduce) time on a clockface	maintain and strengthen time on the hour [O] to 12 o'clock [W] to 10 o'clock	[O] and [W] on the hour to 12 o'clock	[O] and [W] maintain and strengthen on the hour to 12 o'clock [O] also on the half hour	[O] and [W] maintain and strengthen
Ability to recognize common measuring instruments and occasions for their use	[O] maintain and strengthen	[O] and [W] maintain and strengthen	[O] and [W] maintain and strengthen	[O] and [W] maintain and strengthen
Ability to recognize objects cut into equal parts and to identify one of the equal parts by its appropriate name or size	[O] maintain and strengthen for halves and one half	[O] maintain and strengthen for halves and one half	[O] and [W] maintain and strengthen for halves and one half	[O] and [W] maintain and strengthen for halves and one half [O] for fourths and one fourth
Knowledge of the circle and the square as geometric forms		[O] recognition in connection with real objects	[O] maintain and strengthen	[O] and [W] maintain, strengthen and extend
Understanding of groups and numbers in terms of their component parts	[O] and [W] maintain and strengthen for groups as large as 5	[O] and [W] extend to groups as large as 6	[O] and [W] maintain and strengthen for groups as large as 6	[O] and [W] maintain and strengthen for groups as large as 6; operationally to groups of 7

Understanding of component parts expressed and written in two related ways	[0] and [W] develop with groups as large as 5	[0] and [W] extend to groups as large as 6	[0] and [W] maintain and strengthen for groups as large as 6	[0] and [W] maintain and strengthen for groups as large as 6; optionally to 7
Understanding of the dynamics of combining and separating, with intelligent control over addition and subtraction facts	[0] and [W] maintain and strengthen, sums and minuends through 5	[0] and [W] extend to sums and minuends of 6	[0] and [W] maintain and strengthen, sums and minuends through 6	[0] and [W] maintain and strengthen, sums and minuends through 6; optionally to 7
Ability to read and write addition and subtraction facts in abstract form using appropriate operational symbols	[W] horizontal form only, sums and minuends through 5, in relation to pictured representations	[W] extend to facts with sums and minuends of 6 in relation to pictured representations; and to 5 in abstract form alone	[W] extend to include sums and minuends of 6, written abstractly in both horizontal and vertical forms	[W] maintain and strengthen through sums and minuends of 6; optionally to sums and minuends of 7
Understanding of the relationship that permits most addition facts and most subtraction facts to be written in related pairs	[0] develop idea that the order in which groups are combined does not affect size of total group	[0] and [W] develop to sums and minuends of 6 in relation to pictured representations; and to 5 in abstract form	[0] and [W] extend to sums and minuends of 6 in abstract form	[0] and [W] maintain and strengthen through sums and minuends of 6; optionally to sums and minuends of 7
Understanding of the relationship that permits pairs of addition facts to be written with related pairs of subtraction facts to form "whole stories"			[0] for groups to 5	[0] and [W] extend through groups of 6; optionally to groups of 7
Mastery of addition and subtraction facts		[0] and [W] progress toward sums and minuends as large as 5	[0] and [W] through sums and minuends of 5; progress toward sums and minuends of 6	[0] and [W] through sums and minuends of 6; optionally progress toward sums and minuends of 7
Ability to combine 3 groups and to read and write number stories involving 3 addends	[0] sums not exceeding 5	[0] and [W] sums not exceeding 5, in horizontal form	[0] and [W] maintain and strengthen sums not exceeding 5 to include vertical form	[0] and [W] sums of 6 in both horizontal and vertical form
Understanding of the relationships involved when 1 is added to a number and when 1 is subtracted from a number		[0] reintroduce meanings	[0] and [W] to sums and minuends of 10	[0] and [W] maintain and strengthen
Ability to deal with simple problem situations involving combining and separating	[0] maintain and strengthen	[0] and [W] maintain and strengthen	[0] and [W] include problems read by children	[0] and [W] maintain and extend
Working with equal groups as readiness for the ultimate systematic study of multiplication and of division				[0] develop through manipulative experiences only
Disposition to use, and the habit of using, number in practical ways	[0] maintain and strengthen	[0] maintain and strengthen	[0] maintain and strengthen	[0] maintain and strengthen
Possession of desirable emotionalized responses with respect to arithmetic—favorable attitudes, appreciations, and values	[0] maintain and strengthen	[0] maintain and strengthen	[0] maintain and strengthen	[0] maintain and strengthen

[0] Items marked with this symbol specify content that is not covered entirely in the *Book One* pages, either because it does not lend itself to the printed page or because experiences with manipulative materials are suggested for oral development that should precede later written experiences.

[W] Items marked with this symbol indicate written experiences in connection with work on the *Book One* pages or in other printed material.

SYSTEMATIC INSTRUCTION FOR THE SECOND HALF YEAR

	PAGE
Discussion of the First Period of Instruction	136
Text Pages and Lesson Plans, <i>Book One</i> pages 1-25	143
Discussion of the Second Period of Instruction	168
Text Pages and Lesson Plans, <i>Book One</i> pages 26-52	172
Discussion of the Third Period of Instruction	199
Text Pages and Lesson Plans, <i>Book One</i> pages 53-71	203
Discussion of the Fourth Period of Instruction	222
Text Pages and Lesson Plans, <i>Book One</i> pages 72-96	226

Discussion of the First Period of Instruction

Getting Started

For convenience, we have divided the program for the second half year of systematic instruction into four parts. In so far as the program is dependent upon the work-text, each of the four parts is represented in *Book One* by approximately 25 pages. How much time you will give to each part will depend upon conditions within your own classroom, and primarily upon the amount of learning your pupils will bring to *Book One*. Thus, if your pupils, prior to now, have made excellent progress in their systematic study, you will want to move rather rapidly through lessons built around the first unit of the work-text (*Book One* pages 1-25). These first twenty-five pages then would be used primarily for diagnostic teaching. On the other hand, if your group, for one reason or another, has tended to move slowly toward mastery of earlier basic materials, this first unit will provide an optimum opportunity to reteach in a new setting.

On this page and the next one, you will find a list of twenty-four objectives for the first period. Teachers whose pupils worked through the NUMBERS WE NEED, *Primer* program will find that, in simple fashion, that beginning program is reviewed in the first period of instruction of *Book One*. As will be noted, the learning in connection with several objectives is retaught as necessary and then maintained; for example, objectives 5, 8, 9. In other instances, the earlier learning is built upon and extended; for example, objectives 2, 4, 7. In some instances, for example, objectives 10, 11, and 17, the learning is essentially new (but even here a substantial amount of readiness will have been established in advance, in each case).

Another point, which is really a reminder: The list of objectives is not intended to place limits upon your teaching; it is minimal rather than exhaustive. For example, if your pupils (all, or some) want to go on in their rote counting beyond 50 (the point suggested both for the *Primer* program and for the first unit of work in *Book One*), by all means permit them to do so.

Arithmetic Objectives for the First Period of Systematic Instruction

1. Increased ability to use understandingly words for comparison of sizes and positions and many common quantitative terms other than numbers*
2. Increased ability to read numerals—extended to include those from 11 through 30
3. Increased ability to write numerals—extended to include those from 6 through 30

*These objectives are developed orally only, because either the *Book One* pages do not lend themselves to the learning in question or the material serves as readiness for written experiences to come later in the program.

4. Increased ability to read number words—extended to include those from six through ten
5. Increased ability to count by rote as far as 50*
6. Increased ability to use enumeration (rational counting) to identify and reproduce groups as large as 50*
7. Increased understanding of the serial order and relative sizes of numbers orally through 50* with written experiences through 30
8. Increased ability to recognize at a glance the size of regularly patterned groups as large as 10
9. Increased understanding and use of ordinals orally through *tenth** with written experiences through *fifth*
10. Understanding of the meaning of two-place numbers through 30 in terms of the decimal (tens) base of our number system and the notational principle of place value
11. Understanding and ability to count by rote and to enumerate by multiples with written experiences by 2's to 20 orally by 10's to 100*
12. Increased understanding of cent, nickel, dime, and the ¢ sign, including the relative value of each coin and the value of commonly used combinations of these coins not exceeding 10¢*
13. Increased ability to tell and show time on the hour orally to 12 o'clock* with written experiences to 10 o'clock
14. Increased ability to recognize common measuring instruments and occasions for their use*
15. Increased ability to recognize objects cut into halves and to identify one half of an object*
16. Increased understanding of groups and numbers as large as 5 in terms of their component parts
17. Understanding of the relationship that permits most "stories" about a group or number (as large as 5) and two of its parts to be expressed and written in two related ways
18. Increased understanding of the dynamics of combining and separating, with intelligent control over addition and subtraction facts having sums and minuends as large as 5
19. Understanding of the idea that the order in which groups are combined does not affect the size of the total group*
20. Understanding of the fact that three groups may be combined into a single group whose size can be expressed as a single number (limited to sums not exceeding 5)*
21. Ability to read and write addition and subtraction facts with sums and minuends as large as 5
 - a. in relation to concrete or pictorial group representations, and
 - b. in horizontal form only, using the symbols +, -, and =

22. Increased ability to deal with simple problem situations involving combining and separating by using real and representative objects*
23. Increased disposition to use, and a stronger habit of using, number in practical ways*
24. Increased possession of desirable emotionalized responses with respect to arithmetic—favorable attitudes, appreciations, and values*

Discussion of the Separate Objectives

Objective 1, the acquisition of a functional oral vocabulary of comparison and quantitative terms, is given first place in the objectives for all four periods in the term. It is, in a word, something to work on throughout the entire half grade.

We do not always use numerals to identify quantities or to make comparisons or to describe quantitative situations. Thus we may say that there are "a lot" (or "lots") of objects or "few" or "many." Or, we can use the words "nearly" or "about." Or, we can compare groups by using the words, "more," "as many as," or "fewer," and compare sizes by words such as "bigger," "tallest," "thinner," "heavier," and the like. Other quantitative terms are "middle," "right," "left," "up," "down," "in front of," and "in back of" (or "behind").

We know of no complete catalogue of words and phrases of this kind. So far as teaching is concerned, the best practical guide, in determining how many and which of these quantitative terms to teach, is children's needs both inside and outside of the classroom. The terms which have functional use to children should be taught, and they become as truly parts of the arithmetic program as are the number facts. Two rather obvious features of the teaching may be mentioned: first, for each term a clear idea must be developed (what "many" means, for example, as opposed to "few"); and second, the correct word or phrase must be attached to the idea.

The following 27 words of the reading vocabulary new to the first period of instruction are not included in the list of comparison and quantitative words suggested for this period:

by	group	o'clock	ten
car(s)	how	part	together
count	left	put	whole
draw	many	ring	write
eight	nine	seven	yellow
find	no	six	yes
finish	numbers	stories	

Nothing more need be added at this point, except to list the comparison or quantitative words or terms which we have tentatively assigned to the first period.

Oral Vocabulary List for First Instructional Period

about	any	ending	not any
again	begin	enough	pair
almost	beginning	equals	sign
altogether	each	every	zero
answer	end	none	

Objectives 2 and 4 have to do with the reading of the numerals through 30 and of the number words through *ten*. Ability to read the numerals through 10 is tested in the Inventory Tests on *Book One* pages 1 and 2, and further reading experiences with these numerals occur on several of the ensuing pages prior to *Book One*, page 12, when the numerals for 11 to 20 are introduced. The series, for the purposes of reading, is extended on *Book One*

pages 20 and 21 to cover the numerals for 21 to 30. By this arrangement the instructional task as a whole is broken into three parts, and plenty of time is allowed to teach children who start the period with limited ability in counting (which should precede the reading and writing of numerals) to make good their deficiencies in easy stages.

Knowledge of the number words *two*, *three*, *four*, and *five* is tested in the Inventory Test on *Book One* page 2, and these words, along with *one*, appear again on *Book One* page 3, together with the new words *six* and *seven*. The word *eight* is taught on *Book One* page 4, and the words *nine* and *ten* on *Book One* page 11. In each instance when a number word is taught, it is associated both with the standard pattern therefor and with the corresponding numeral. Again, the pace is kept slow in order to assure sound learning.

Objective 3 (writing the numerals to 30) should offer little trouble. As has already been explained, the numerals to 5 (the limit in the *Primer* program) are included in the exercises on *Book One* page 2 (an inventory test), after which the numerals 6 to 10 are taught slowly, not more than two in a single lesson. Then come the series 11 to 20 and 21 to 30. The teaching suggestions for these lessons in the first period should give you all the help you will need to assist your pupils in achieving the objective for writing numerals.

Objective 5, ability to count by rote, will probably have been achieved already by your pupils. Most children are well started in rote counting when they come to school and, having begun, they themselves tend to extend the limits of such counting. If some of your pupils are unable to count to 50, you have time to help them develop this ability during the first period. Since the *Book One* pages are not well adapted to teaching this objective, you must rely on oral work, in which your more capable pupils can be of large assistance as helpers to the teacher. As you know, the troublesome points, once children can count to 20, come when counting is carried into the successive decades—the 30's, the 40's, and so on. Give assistance as needed by individual children.

Objective 6 puts counting to work in the enumeration of groups of objects for the purposes of identification ("How many pencils are in this box?") and of reproduction ("Give me ten pencils."). As stated in the objective, this ability is extended to cover groups as large as 50 (the proposed limit for rote counting), but there is no need to use groups so large and no prohibition against the use of larger groups. The needs of your pupils provide the best guide to determine how far you will go in instruction respecting the objective.

Objective 7, knowledge of the places of numerals in the series and the relative sizes of the numbers for which they stand, is tested for the numerals 1 to 10 on *Book One* page 2, reviewed on *Book One* pages 4 and 11 and thereafter for each of the additional segments, 11 to 20 and 21 to 30, as each such segment is taught on *Book One* pages 12–15 and 20–21. Much is learned about the places of numerals through rote counting, but the work-text provides written experiences to check and to insure learning by requiring the writing of the numeral which comes before and after a given numeral. For example, the numeral before (or after) 18 is to be written in a blank space. In this connection, too, time is taken for the comparison of numbers as to size (one phase of their meaning), as in the selection of the largest (or the smallest) numeral in a series like 26, 19, 30, 22.

Objective 8 calls for the ability to move from the serial idea of numbers to the group idea and identify by a glance regularly patterned groups of representative objects (such as stars or diamonds) without counting. The patterns for the numbers through 5 are easily mastered, and they are included in the inventory test on *Book One* page 2. Thereafter the patterns for the numbers to 7

are assembled on *Book One* page 3 where they are reviewed (or can be retaught slowly). The patterns for 8, 9, and 10 are presented as the corresponding number words and the writing of the numerals are taught on *Book One* pages 4 and 11.

Objective 9, the correct use of the ordinals orally to *tenth* and with written experiences to *fifth*, requires that your pupils (and you) know the distinction between ordinal and cardinal numbers. "Fifth," the ordinal, names the *single* object which comes after the fourth and before the sixth. "Five," the cardinal, names the *total group*. However, if one says, "Page 5," or "Pupil number 5," etc., he is using *five* for an ordinal purpose. Functional knowledge of the ordinals to *tenth* is tested in the Inventory Test on *Book One* page 1, after which you will know just what instruction you will need to give. Many of the *Book One* pages where objects appear in rows, can be made use of in order to teach or review or maintain skill in the use of ordinals.

Objective 10 has to do with the meaning of two-place numbers to 30 and the notational principle of place value. By counting and enumerating, children acquire the *serial* idea of numbers like 16, 23, and 25; but that is all, as useful as is this knowledge. Now, the way in which we write two-place numerals gives visible evidence that these numbers differ from the numbers 1-9, which are represented by a single digit. It takes two digits to write 19 and 37, and the order in which these digits are written is important. In two-place numerals, the digit in the first place (at the right) is for ones; the digit in second place, for tens. From this fact it is clear that understanding of *place value* is essential, and this understanding is to be had, not by memorizing that we write nineteen as 19, and not as 91, but by learning the *structure* of these numbers in terms of tens and ones.

We proceed slowly: first, the series 11 to 20 (*Book One* pages 12 and 13); then the series 21 to 30 (*Book One* page 20). Children first see the structure of the numbers 11 to 20 (*Book One* page 12) without using the words "tens" and "ones." That is to say, the group of 10 remains unchanged, as a ring of ten children, with extra children (two, etc.) to be combined with the ten. Then, pupils are ready for the technical vocabulary (*tens* and *ones*) and learn to recognize the exceedingly useful symbol Φ , for 10, in identifying numbers to 20 and, later (*Book One* page 20), to employ it in reproducing two-place numbers. As part of their experiences with two-place numbers, pupils also learn much about the comparative sizes of the numbers to 30.

Objective 11 refers to a skill (counting by multiples) that many of your pupils will have learned without systematic instruction and purely because of their interest in counting and of its usefulness in their daily lives (as in their games). Even so, it is worth while to have them study the sequence of numbers as it is introduced in connection with counting by 2's on *Book One* page 15, first with concrete experiences, then in working with the chart on *Book One* page 14, and then in Ex. 3 on page 15. By "study" we mean that they should see the rationale—skipping the odd numbers and mentioning only the even numbers. Oral work in understanding counting by 10's is introduced in this period with Looking-Ahead activities suggested on *Book One* page 8.

Objective 12, understanding of the coins cent, nickel, and dime, and ability to use the symbol ϕ , were taught in the *Primer* program. For children who acquired the understanding and ability in question, occasional oral use in this period is expected to enable them to maintain their knowledge. Oral activities are suggested in connection with Teaching *Book One* Page 20.

Objective 13, the ability to tell time on the hour, is of such general value that parents and teachers commonly teach the skill. Ability to tell the time at 11 o'clock and 12 o'clock is postponed in *Book One* until after children have learned how to read these numerals, but oral experiences are suggested during the first period of instruction, as preparation.

Objective 14, understanding of certain common measuring instruments and knowledge of occasions for their use, appears first in the *Primer* program; and you will want to provide review of the understanding and ability in question in the first period of instruction. *Book One* page 36 in the second period contains exercises relating to the ruler, food-store scales (two types), the weather thermometer, the measuring cup, the tape measure, and the bushel basket. You may want your pupils to have some oral experiences with these instruments in the first period of instruction. Note that the purpose of these lessons is to acquaint children with the process of measurement and the more common instruments used therefor—not to teach them to *measure*. Precise measurement can better follow a well-developed understanding of measuring instruments and their uses.

Objective 15 calls for the ability to identify halves when single objects are divided into two equal parts, this and this only. We are referring here to *written* exercises. At this time children lack the necessary eye-hand co-ordination accurately to divide objects into halves by drawing lines (reproduction). They can, of course, and they should, have experiences in marking halves of such easily divided things as sheets of paper, where the process of careful folding will help them. In the first period no *Book One* pages are included for maintaining the identification of halves; but, as suggested in connection with *Book One* page 19, it will be well to provide manipulative experiences, augmented perhaps by using drawings made on the chalkboard.

Objectives 16 and 17 involve understanding of the component idea of the numbers as large as 5. Remember, first, that the child has the *serial* idea of 5, for instance, when he can enumerate correctly groups of objects of this size or select five from a larger group or complete a smaller group to 5; in this sense, "five" is a loose collection of ones. Next, he has the *group* idea of 5 when he can deal with 5 without first reducing it to so many ones, as when he can recognize at once as "five" a regularly structured pattern such as $\cdot \cdot \cdot$. Then "five" has a unity, an integrity of its own. And last of all (so far as *Book One* is concerned), he has the *component* idea of 5 when he knows that it consists of 1 and 4, or 2 and 3, or 3 and 2, or 4 and 1. The child who has the component idea of 5 as 3 and 2 (or as 2 and 3) is well on his way to knowing four number facts:

$$2 + 3 = 5, \quad 3 + 2 = 5, \quad 5 - 3 = 2, \quad \text{and} \quad 5 - 2 = 3.$$

In the *Primer*, children had experiences which were aimed to develop the component idea of the numbers 2, 3, 4, and 5. In *Book One*, they do not start right in with the component idea for 6. On the contrary, since this idea is so important, we take four pages to review or teach the idea for the numbers through 5 and we do not introduce the idea for the number 6 until *Book One* page 42 (the second unit of instruction). See *Book One* pages 5 and 6 where the pupil makes one statement about the group and its parts, and pages 22, 23, 24, and 25 where with the aid of the bracket $\underbrace{\quad}$ the pupil learns to make related statements about a group and its parts. Accordingly, if your pupils had no experiences with the *Primer*, you will have these written exercises requisite to the teaching, supplemented by suggestions for oral experiences as preparation.

Objective 18 refers to intelligent control over the addition and subtraction facts with sums and minuends through 5. The child who can promptly answer "Five" when asked, "How many are three and two?" has given no convincing evidence that he knows the fact as he should know it. Confronted with the orally presented problem, "Tom put three canaries in the cage. There were two canaries in the cage already. How many canaries were then in the cage?"—confronted with this situation, the pupil may be helpless. He cannot see in this verbal problem the familiar question, "How many are two and three?" Actually, in words

it is *not* there; but the generalization *is* there, and this the pupil does not possess.

The analysis of this negative instance serves to point up the learning of number facts. Facts are not learned until (a) the numbers involved are understood (here 2, 3, and 5); (b) the process of combination (addition) is understood; (c) what happens to the numbers in addition is understood; and (d) the relationship is generalized to cover all situations involving the addition of groups of two and three like-things (or abstract numbers). And, finally, (e) the facts are not known as they should be known until they have been mastered, so that the sums (or remainders) are forthcoming instantly, correctly, and confidently.

But this stage of mastery is not to be achieved at once. The attempt to produce it too soon is disastrous, for the consequence is the memorization of meaningless words. Instead, mastery is a final stage in learning, coming only after a carefully graded series of experiences which build toward it. Note the instructional plan in *Book One*, illustrated here only in the case of the addition facts. These facts are derived (*Book One* pages 7-10) from the study of the component parts of the numbers to 5, being written first in the horizontal form only, first without and then with the signs $+$ and $=$. The pace is slow, starting with easily identified sub-groups of real objects with the instruction, "Find how many all together," and the introduction of the $=$ sign (*Book One* page 7); proceeding then (still with pictured groups of real objects) to a shortened series of directions (*Book One* page 8); next to conventionalized and representative objects (*Book One* page 9), where both $+$ and $=$ signs are used; and finally, to the reproduction of groups and the writing of the addition fact in each exercise (*Book One* page 10). Oral practice for mastery does not begin in this period and there is no written test before *Book One* page 29, in the second period. The vertical form of writing the story is not taught until the third period of instruction.

Objective 19, the idea that the order in which groups are combined does not affect the size of the total group, is one of our most important and useful mathematical principles. Among other things, this Law of Commutation permits the child to study addition facts in related pairs (for example, $3 + 2 = 5$ and $2 + 3 = 5$) and thus reduces the learning load that would prevail if the principle were not utilized. Also, an understanding of this relationship aids the child in his study of pairs of subtraction facts (for example, $5 - 2 = 3$ and $5 - 3 = 2$). Other applications of the Law of Commutation will be developed throughout the child's work in the field of arithmetic.

Objective 20. Children need to understand that more than two groups can be combined into a single group whose size can be expressed as a single numeral. When combining three groups, it is important for children to learn a way to find the total other than by putting all groups together at once and then counting the number of things in all. Children must be led to understand that we can, and do, first find the total when two of the three groups are combined, and then find the final total when the third group is combined with the other two which have been put together.

Objective 21 involves use of $+$, $-$, and $=$ in reading and recording addition and subtraction number facts. (In the written records, the $+$, $-$, and $=$ are supplied; at this time, children do not make the symbols.) This new knowledge is taught in connection with *Book One* pages 7, 9, and 18 and so, comparatively late in the review (or reteaching) of the facts. The transition is therefore easy. At this time, pupils read $+$ as "and," $-$ as "take away," and $=$ as "are" or "is."

Objective 22, the ability to deal with simple problem situations, is intended to put arithmetic to work. Simple number situations involving the combining of groups (addition) and the separation of groups (subtraction) can be "solved" by manipulating real objects

(pencils, crayons, books) or representative objects (sticks, acorn cups, buttons); and experiences of this kind go a long way in teaching the basic ideas of these two processes. Of course, as soon as they can, your pupils will deal with such situations in an abstract fashion, by using numerals, but they should not be hurried to this more mature stage. At this time, then, you may continue to give many experiences in problem-solving for solution by the method of manipulating objects.

In connection with this objective, the best problems are those that arise out of classroom situations; make use of them to the full. Or, you may (and should) make up problems of your own. The following problems are suggestive of the kind which are appropriate. If you use them, feel free to alter them as you see fit, among other things substituting numerals for those given, in order to provide practice as needed.

Whatever problems you use, employ real objects of the classroom (the children themselves included) and have your pupils act out or dramatize the actions suggested. (After all, a child, or a chair, can be a bird or even a sheet of paper, for this purpose.) Also, let each pupil put in front of him representative objects, such as counters, and let him move about groups and sub-groups as he "works" the problems. Finally, when your pupils are ready for it, make it a practice to record on the chalkboard the solutions arrived at (with or without $+$, $-$, and $=$).

Put-together problems

1. In Mary's row at the movies there were 3 girls and 1 boy. How many children were in that row?
2. Joe had 2 sheets of paper. He got 2 more sheets of paper. Then how many sheets of paper did he have?
3. Fred counted 2 large goldfish and 3 small goldfish in the bowl. How many goldfish in all did Fred count?
4. On a pile of 3 books Ann put 1 more book. How many books were there in the pile then?
5. Tom's father planted 4 small bulbs in a red pot and 1 large bulb in a green pot. How many bulbs did he plant in all?
6. Ann pasted 1 red stamp and 3 blue stamps in her book. She pasted how many stamps in all in her book?
7. I have 2 cents in one hand and 2 cents in the other hand. How many cents have I in both hands?
8. Ruth cut out 3 paper dolls. Jane cut out 2 paper dolls. How many paper dolls did the two girls cut out together?
9. In his pencil box, Sam has 4 yellow pencils and 1 brown pencil. How many pencils are in Sam's box?
10. One sparrow and 1 robin are how many birds in all?
11. There are only 2 big houses and 1 small house on my street. How many houses are there on my street?
12. I put 1 orange in a bowl with 4 other oranges. Then there were how many oranges in the bowl?
13. I had 3 cents in my bank. I put 1 cent more in the bank. Then how many cents in all were there in my bank?
14. My sister picked 2 roses and then 3 more roses. How many roses did she pick?
15. There was 1 chair at the table. Dick brought 4 more chairs. That made how many chairs at the table?
16. In a story about animals Bob read about 1 little monkey and 2 large monkeys. How many monkeys was that in all?
17. Ann made 3 marks on her paper. Then she made 2 more marks. How many marks did Ann make?
18. The mailman brought me 1 letter and my sister 3 letters. How many letters was that in all?
19. In his book, Ted read 2 pages and then 2 more pages. How many pages did Ted read in all?
20. Mother baked 1 loaf of brown bread and 3 loaves of white bread. How many loaves of bread did she bake in all?

Take-away problems

1. Ted had 4 cents. He lost 1 cent. How many cents did he have left?
2. Three boys were playing a game in the schoolyard. One of them went home. How many boys did that leave in the schoolyard?

3. There were 2 pears on a plate. Sue ate 1 of them. How many pears were on the plate then?
4. On the table were 5 books. Ned put 1 of them on a shelf. How many books were left on the table?
5. Four squirrels were playing in a tree. Two of them ran down to the ground. How many squirrels stayed in the tree?
6. There were 5 cows in the field. Don drove 3 of them into the barn. Then there were how many cows in the field?
7. Three children were riding in Mr. Brown's car. One child got out. How many children stayed in the car?
8. In the refrigerator there were 4 eggs. Mother threw away 1 egg that was bad. How many eggs were left in the refrigerator?
9. Dick had 5 cents. He spent 2 cents for an eraser. Then he had how many cents?
10. There were 5 birds on the fence. Four of them were frightened and flew away. How many birds were left on the fence?
11. Ted's coat had 3 buttons. Two buttons came off. Then there were how many buttons on his coat?
12. Frank had 5 pet white mice. He gave away 4 of them. How many white mice did he keep for himself?
13. Mother put 3 pitchers of milk on the table. We drank the milk in only 1 of the pitchers. How many pitchers of milk were left?
14. Mr. Smith had 4 trees in his yard. He cut down 3 of them. How many trees were left in the yard?
15. Mother had 4 plants. One of them died. How many lived?
16. Doris had 5 doll dresses. She gave away 3 of the dresses. How many of the doll's dresses did she have to play with then?
17. Four pigs were in a pen. Two of them got out. How many pigs were left in the pen?
18. There were 5 clean sheets of paper in my desk. I used 1 of them. How many clean sheets of paper were there then in my desk?
19. Joe had 4 brown marbles in his marble bag. He took 3 of them out of the bag. How many brown marbles were left in the bag?
20. A branch on the apple tree had 5 apples. Two apples fell off. How many apples were left on the branch?

Objective 23, the disposition to use number in practical ways, is intended to emphasize the social aim of arithmetic. It will be repeated in the list of objectives for each period, for it is highly important that your pupils become accustomed to recognizing in their activities, in the classroom and outside, chances to use the arithmetic they know and form the habit of using it to practical ends. You can help them most, probably, by calling their attention to the arithmetic that is involved in many, many of the happenings in the classroom. Encourage pupils, too, to report the uses of arithmetic in their daily lives. One teacher had an understandable thrill when a pupil rushed in to tell her, "Miss —, I just saw 'Three and two are five' in the sky! Three airplanes were flying together, and two more airplanes, too, and I knew right away that there were five. I didn't have to count, either."

Objective 24, the possession of desirable emotionalized responses, like the preceding two objectives, is really a term objective—actually an objective for arithmetic for *all* grades. We want children from the outset to *feel* toward arithmetic a respect for its logic, a desire to do well, and an appreciation of its worth. Be on the alert to detect signs to the contrary—an indifference toward number work, evidence of frustration, and the like. If not corrected at once, their long-time consequences are certain to be harmful.

Teaching the Pages of Book One

Take plenty of time, perhaps a full period of twenty minutes or so, to allow your pupils to leaf through *Book One* when it is put into their hands for the first time. Let them point out features that interest them and tell why.

Our teaching suggestions are organized under these captions for a *Book One* page: **Pupil's Objective(s)**, **New Words**, **Background**, **Teacher's Preparation**, **Pre-book Lesson**, **Book Lesson**, **Differentiations and Extensions**, and, in connection with certain pages, **Looking Ahead and Reminders**.

The first item regularly is **Pupil's Objective(s)**, a statement of the purpose or purposes of the lesson in terms of objectives the children are to attain.

The heading **New Words** appears whenever a new word (or two) occurs on a page. The vocabulary control in *Book One* is similar to that applied in the *Primer*. No more than two new words are used on a page and each new word is used on that page at least twice.

Often then there is a section entitled **Background**. Here, suggestions are made for relating the new idea or skill (*a*) to something that has gone before and so, for example, assuring readiness for the new learning; or (*b*) to something which will come later; or (*c*) to both. Further, this section frequently enables the authors to point up more clearly the purpose they had in mind for the lesson.

The **Teacher's Preparation** suggests materials which you may wish to prepare and assemble before beginning the class work, such things as the Number Chart or the Counting Chart or representative objects or the Number Cards that should be at hand when you start the lesson.

The **Pre-book Lesson** suggests the activities you will want to organize before presenting the *Book One* page in question. In pre-book work your pupils will use, for example, real objects or representative objects or both to help them discover the ideas that will be reinforced a little later in connection with the picture in *Book One*. The situations and materials we suggest for these preliminary experiences may be considered as only illustrative. You will often substitute other experiences that are more suited to your class situation.

Next comes the **Book Lesson**, the section where we suggest how to teach the lesson—or better, *one way* to teach it. If you hit upon a superior procedure, by all means use it. In these sections you will find (always in heavy type) questions suggested for your use in developing the work in connection with the page of the text.

The section, **Differentiations and Extensions**, which appears after the **Book Lesson**, is intended to provide activities for the *more capable children* or for the *slower learners* and many times for *all pupils*. This last is important, for all pupils, as well as the *more capable children* and the *slower learners*, should have extended experiences as a total group.

The word **Reminder** is inserted now and then. It suggests oral experience intended to maintain an objective from one instructional period to another.

Looking-Ahead oral activities every so often are planned for and suggested at spaced intervals in order to prepare your pupils for written work to come later in the program.

May we point out some things you should find helpful as you teach the pages of *Book One*? Many times a page has been designed for multiple use. That is, in addition to work on the objectives set up for the page, activities are planned for experiences with comparative and quantitative terms and with ordinals, as well as for maintenance and for activities in looking ahead to work to come later in the program.

When the pupil is to draw objects, every effort has been made to insure adequate space for work and the planned work has been kept simple.

Progression on the page has been planned so that the pupil will move from pictures of the real to pictures of the representative to the abstract—that is, from the known to the unknown, from the simple to the more complicated.

Some decidedly helpful items you will discover as you and your pupils make progress through *Book One* are the number dictionaries in connection with serial order, with patterns and coins; the unusual helps for teaching the writing of figures—such as a starting dot, arrows to indicate the direction in which

the pencil is to move, and the guide lines for suggesting top and bottom limits; clear and simple figures; emphasis on simplicity when the child is to draw items; the tie-up with social studies such as safety and communications; progression of work always from easiest to more difficult; and a definite plan in the development of the work with each number.

The Inventory (Book One pages 1 and 2)

The first two pages of *NUMBERS WE NEED, Book One* provide an opportunity to inventory important selected number abilities which received systematic attention and development in *NUMBERS WE NEED, Primer*. Regardless of whether or not your pupils have followed the *Primer* program, you should use this inventory at the outset of your work with *NUMBERS WE NEED, Book One*.

The number abilities which are inventoried are listed below, along with the pages and items in the pupil's book which relate most specifically to each item:

1. Ability to identify the sizes of groups as large as 10.
(*Book One* page 1: Ex. 1, 2)
2. Ability to recognize standard patterns for groups as large as 5.
(*Book One* page 2: Ex. 4, 5)
3. Ability to reproduce groups as large as 10 in several ways.
(*Book One* page 1: Ex. 3; page 2: Ex. 5)
4. Ability to read numerals to 10.
(*Book One* page 1: Ex. 2, 3; page 2: Ex. 1, 2, 3, 5)
5. Ability to read number words to *five*.
(*Book One* page 2: Ex. 4)
6. Ability to write numerals to 5.
(*Book One* page 2: Ex. 4)
7. Knowledge of the serial order of numerals to 10.
(*Book One* page 2: Ex. 1, 2, 3)
8. Ability to show the ordinal position of things in sequence as far as fifth.
(*Book One* page 1: Ex. 1)

You will be assisted in summarizing and interpreting the results from this inventory if, after your pupils have completed

Book One pages 1 and 2, you prepare and use an Inventory Record such as the one suggested below.

List the names of all children down the left-hand column of the Inventory Record sheet. The numerals across the top correspond to the number abilities listed at the left. Based on each child's work on *Book One* pages 1 and 2, make and record an evaluation of the extent to which each number ability has been developed by each child to date. Use the following code and criteria:

"OK" indicates satisfactory development; little or no difficulty with the items involved.

"?" indicates uncertain or questionable development; difficulty with some of the items involved.

"0" indicates unsatisfactory development; difficulty with most or all of the items involved.

INVENTORY RECORD

Name of Pupil	Number Ability							
	1	2	3	4	5	6	7	8
Betsy C.	OK	OK	?	OK	0	?	OK	0
Richard E.				etc.				
Susan K.								
Robert M.								
etc.								

The completed chart will enable you to understand better the strengths and weaknesses of each child as you begin the work of the second half year. It also will give you a basis for grouping together children having common strengths or weaknesses and thus provide more effectively for some of their needs.

CONTENTS of BOOK ONE

PAGES	
1-2	Inventory
3-4	Writing 6, 7, 8; reading the number words <i>six, seven, eight</i>
5-6	Component parts of groups to 5
7-10	Reteaching addition facts, sums to 5
11	Writing 9, 10; reading the number words <i>nine and ten</i>
12-15	Learning about the numbers from 1 to 20; counting by 2's
16-19	Reteaching subtraction facts, minuends to 5
20-21	Learning about the numbers to 30
22-24	Learning more about the component parts of groups to 5
25	Do You Know? (Test)

26	Addition problems
27-28	Addition facts in pairs, sums to 5
29	Addition maintenance
30-31	Learning about the numbers to 60
32	Subtraction problems
33-34	Subtraction facts in pairs, minuends to 5
35	Subtraction maintenance
36-37	Identifying measuring instruments; telling time on the hour
38	Addition and subtraction problems; maintenance
39	Many Things (Review)
40-41	Addition of 3 addends, sums to 5
42-43	Component parts of a group of 6
44-46	Pairs of addition facts, sum 6
47	Addition maintenance
48-50	Pairs of subtraction facts, minuend 6
51	Subtraction maintenance
52	Do You Know? (Test)

PAGES	
53	Addition and subtraction problems; maintenance
54-55	Learning about the numbers to 100; counting by 10's
56	Fractions: $\frac{1}{2}$ of an object
57	Coins: cent, nickel, dime
58-60	Adding vertically, sums to 6
61	Many Things (Review)
62	Adding 1 to a number
63-65	Subtracting vertically, minuends to 6
66	Addition and subtraction problems
67	Subtracting 1 from a number
68	Comparing sizes of objects
69	Addition and subtraction problems
70-71	Do You Know? (Tests)

72-73	Pairs of addition and of subtraction facts (readiness for the whole story about a group and its parts)
74-76	The whole story about a group and its parts
77	Comparing lengths and working with simple geometric forms
78	Addition and subtraction problems; maintenance
79-82	Do You Know? (Tests)
	* * * * *
83	Component parts of a group of 7
84-86	Pairs of addition facts, sum 7
87	Addition and subtraction maintenance
88-90	Pairs of subtraction facts, minuend 7
91	Addition and subtraction maintenance
92-93	Whole stories about a group of 7 and its parts
94	Addition and subtraction problems; maintenance
95-96	Do You Know? (Tests)

Text Pages and Lesson Plans, Book One Pages 1-25

The lesson plans and reduced *Book One* pages 1-25 that follow are concerned with the first unit of work. *Book One* pages 1 and 2 are for inventory purposes. If your pupils have recently com-

pleted the test pages at the end of *NUMBERS WE NEED, Primer* then pages 1 and 2 will provide final confirmation of the status of each of your pupils.

Pupil's Objective. To show (a) ability to identify and reproduce groups through 10; and (b) ability to reproduce ordinals through *fifth*.

New Words: *how, many*

Background. *Book One* pages 1 and 2 inventory some of the important number abilities which were developed in the *Primer* program. This inventory work is designed to be administered to the entire class at one time, so it will not prove to be time consuming in any way.

Pre-book Lesson. Have some of the children tell about various kinds of parties they have attended. Then ask, **How many of you have ever been to a Valentine party?** Have them tell about some of the things they did at the Valentine party. Then have the children open their work-texts to page 1.

Book Lesson

Ex. 1. Talk with the children about the various things they see in the picture (children, party hats, balloons, glasses, plates, cakes, hearts on the tablecloth, etc.) but avoid indicating how many things of each kind.

Ex. 2. (Identification) Say to the children: **Look at the row of things just below the big picture. Do you see the pictures of the glass, the paper heart, the paper hat, the girl, and the plate?** Who thinks he can tell me what we are to do each

*When you see this symbol, watch for opportunities in the lesson to use the *Ginn Arithmetic-Stick* described on *Teachers' Edition* page 9.



1. How many? How many? How many? How many? How many?



time? Bring out the idea that the children are to find how many of each thing they see in the big picture and then, choosing from the three number symbols given below the small picture, draw a ring around the numeral that tells how many of that thing there are.

a. Say to the children: **How many glasses do you see on the table in the big picture?** As the children respond correctly say: **Yes, there are 8 glasses on the table in the big picture. Do you see that a dashed ring has been drawn around the numeral 8 just below the picture of the glass? Take your pencil and make this a solid ring to tell us that there are 8 glasses on the table in the party picture.**

b. Then say to the children: **Now, how many hearts do you see on the tablecloth in the party picture? Are there 8 or 10 or 9? Draw a ring around the numeral that tells how many hearts there are.**

c. Then say to the children: **Now let's see if you can finish the rest of this row by yourselves. You are to find out and tell how many paper hats you see in the big picture, how many girls you see in the big picture, and how many plates you see. Each time you are to draw a ring around the numeral that tells how many.**

Ex. 3. (Reproduction) a. Next say to the children: **Now look at the next row on this page. For the row beginning with the big numeral 7 and some pictures of hats, you are to draw enough more hats so that there will be 7 in all. One more of the hats has been drawn with dashed lines to show you how easy it is. Trace over this hat and then make as many more as you need so that all together you will have 7 hats in this row.**

b. Say to the children: **Now look at the last two rows on this page. You see some glasses and some cupcakes. In one row you are to draw as many more glasses as you need so that there will be 10 in all. In the other row you are to draw as many more cupcakes as you need so there will be 9 in all. In each row one of the things you need to draw has been started with dashed lines. Trace over this dashed one and then draw some more just like it. When you finish there should be 10 glasses all together in the one row and 9 cupcakes all together in the other row.**

(*Ordinals in the picture*) Say to the children: **Now look back to the big picture at the top of the page. Look at the row of hearts which you see on the front of the tablecloth.**

Take your red crayon and color the second heart.

After that has been done, give the following instructions:

Draw a ring around the fifth heart.

Put an X on the third heart.

Put a big dot inside the fourth heart.

Recording the Inventory

This completes the work of the inventory for this page. Check each child's work carefully and record his status on your inventory sheet. (See sample for making an inventory chart on *Teachers' Edition* page 141.) Use the following code and criteria for recording:

"OK" indicates satisfactory development; little or no difficulty with the items involved

"?" indicates uncertain or questionable development; difficulty with some of the items involved

"0" indicates unsatisfactory development; difficulty with most or all of the items involved

Pupil's Objective. To show the abilities (a) to deal with the serial order of numbers through 10; (b) to write the numerals through 5; (c) to recognize the patterns and the number words through five; and (d) to reproduce groups through 10 in three different ways.

Pre-book Lesson. Ask: Have any of you ever been on a treasure hunt? If some children have, let them tell a bit about a treasure hunt. If not, explain what a treasure hunt is. In either event, bring out the idea that in some treasure hunts you go from one place to another and then on to another and so on before you finally reach the treasure.

You may want to take a little time to play a Treasure Hunt game with your children. To do this, use a simple object, such as a pencil or a crayon as the "treasure", and hide it somewhere about the room. On slips of paper write three or four simple notes giving directions to follow in looking for the "treasure." Hide these notes at appropriate places throughout the room. Tell one child where the first note is located. Have him find it and then have him designate another child to do what the note says. Continue this until the "treasure" is found.

Note that this game provides opportunity for application of reading skills as well as being of value for inventory purposes.

Book Lesson

Ex. 1. Say to the children: Let's open our books to page 2. Look carefully at the green picture at the top of this page. What do you see in the treasure-hunt picture? As youngsters respond to this question, try to prevent them from mentioning these things in the same serial order in which they appear in the picture.

Now say to the children: Let's find 1 in the picture. Where shall we go from there? As pupils say, "To 2," tell them to draw a line from the 1 to the 2. Do the same with them for proceeding from 2 to 3. Then say: Now always within the picture keep on drawing a line in this same way, going from one numeral to the next until you come to the treasure at 10. The line will show you how the treasure hunter went to find the treasure.

Ex. 2. a. Say to the children: Now look at the first row of red boxes beside the red 2. In that row do you see the numeral 7 in one box, the numeral 8 in the box beside it, and nothing in the box beside that? Do you see the numerals 7 and 9 outside that row of boxes? Which numeral should go in the empty box after the 7 and the 8? Yes, the 9 should go there. That is why a dashed ring has been drawn around the 9. Use your pencil to trace over this dashed ring and make a solid ring around the 9.

b. Then say to the children: Now look at the next row of boxes. Look at the numerals 4 and 5. Which numeral should go in the empty box, the 6 or the 9? Draw a ring around the numeral that should go in the empty box after 4 and 5.

c. Repeat the next two rows in the same way. In each row draw a ring around the numeral that should come next in the empty box after the two numerals that are given. Stop when you have finished these two rows.

Ex. 3. Now look at the next group of boxes. How are these different from the ones you just worked with? This time it is the first numeral that is missing. You are to draw a ring around the numeral that comes before 7 and 8, then a ring around the numeral that comes before 3 and 4, and so on. In each of the four rows, draw a ring around the numeral that should come before the two numerals that you see in that row of boxes.

Ex. 4. Now look at the first row of boxes going across the page. Some of these boxes have star patterns in the little spaces at the top and some have words.

a. Look at the first box. How many stars do you see in the space at the top? (5) Do you see that a dashed 5 has been written in the box to tell how many stars there are? Trace over this numeral with your pencil. Now, write numerals to tell how many stars you see in each of the next two boxes.

b. Now look at the box that has the word "two" in the space at the top. Underneath this word write the numeral for "two." Then, in each of the last three boxes, write the numeral for the number word in the space at the top of the box.

Ex. 5. Now look at the boxes at the bottom of this page.

a. In the first box the 6 in the corner tells you that you are to draw a ring around six of the dots. Draw the ring.

b. Look carefully at the dots in the box with 8 in the corner. How many dots are there in the left-hand group in this box? (5) You are to draw a ring around these dots and around enough more in the other group so that your ring will go around eight dots in all.

c. In each of the next two boxes you are to draw as many dots as the numeral in the corner tells you to.

Recording the Inventory

After the children have finished this page examine the work of each child carefully. Then record the results on the inventory record sheet you have prepared for use with *Book One* page 1.

2

The Numbers 1 to 10

1.

2.

7	8		7	9
4	5		6	9
8	9		10	5
5	6		8	7

3.

6	9		7	8
1	2		3	4
10	7		8	9
4	9		5	6

4.

★ ★ ★	★ ★	★ ★	two	four	three	five
5						

5.

6	8	7	10

Pupil's Objectives: (a) To review patterns, numerals, and number words for 1 to 5; and (b) to learn to write the numerals 6 and 7 and recognize the corresponding number words *six* and *seven*.

New Words: *six, seven*

Pre-book Lesson

Arrange *Pattern Number Cards* (see *Teachers' Edition* page 13) for 1 to 5 in random order along the chalk tray. Do the same, at different places along the chalk tray, with numeral cards for 1 to 5 and number-word cards for *one* to *five*.

1. Ask a child to pick the card with the smallest number of dots (1) from among the *Pattern Number Cards* and place it at the left in the top pocket of a wall pocket chart (such as is used in reading). Then have a second child pick out the corresponding numeral (1) from the set of numeral cards and place it in the pocket chart next to the "1" dot card. Then have a third child pick out the corresponding number word (*one*) from the set of number-word cards and place it beside the other two cards in the top row of the pocket chart. Finally, ask each child to write the numeral 1 on a sheet of paper and hold it up for you to see.

2. Proceed in the same way for 2, 3, 4, and 5. Build row by row in the pocket chart, and have children write each number symbol in turn, as suggested above.

3. Tell the children that they now are going to learn about two more groups.

3

Writing 6 and 7

1	2	3	4	5	6	7
one	two	three	four	five	six	seven

six	6	6	6	6	6	6
six						
six						

seven	7	7	7	7	7	7
seven						
seven						

a. From the set of randomly arranged *Pattern Number Cards* for 6 to 10, see if any child can select the next group after 5 and tell you its name. If not, show the children the 6-pattern, counting the dots with them and then emphasizing the form of the standard pattern. Place the card for the 6-pattern in the next row in the pocket chart. In a similar manner, move on to the numeral 6 and the number word *six*. Show the children how to write the numeral 6 on the chalkboard, between ruled lines, but do not dwell on it at this point, since that is one of the major purposes of the Book Lesson. In writing the numeral 6, emphasize where to begin, the direction to proceed, and when to end.

b. Similarly, build the "7-row" in the pocket chart. Also show how to write the numeral on the chalkboard.

Book Lesson

Ex. 1. Call attention to the sequence at the top of the page. Help the children to sense that this is the same thing they have built up on the pocket chart, but it is arranged in slightly different form.

Ex. 2. Refer to the first row of 6's in the pupil's book, calling attention to the standard pattern and the number word *six*. In the first three boxes after the pattern, have the children put their pencil points on the starting dot each time and, following the direction of the arrow, trace over the figure. Have the children do the same in the remaining boxes, noting that the figure in each of the last three boxes is dashed. By tracing over it the children will make a solid figure like those in the previous boxes. Have the children continue their practice in the next two rows, where less direct guidance is given in each row. Be sure to circulate among the children as they work on these two rows and assist children who may be having difficulty in forming the figure.

Ex. 3. Proceed in the same way with the three rows of work on writing 7.

Differentiations and Extensions

1. For *slower learners* who may have difficulty in forming the numerals for 6 and 7, use either or both of the following:

a. Cut numerals from sandpaper, mount them on cards, and have the children trace over the sandpaper numerals with their fingers in the same manner as for writing the numerals.

b. Provide extra-practice sheets with work similar to that in the pupil's book for writing 6 and 7. Lead the children from rows where they receive much guidance to those where they must write the figures more independently.

2. Have *all pupils* engage in the following experiences:

a. Using the *Pattern Number Cards*, show patterns for groups to 7 in random order and have children tell "how many" in each group shown. Show each card only briefly, so that pupils will have enough opportunity to sense the form of the pattern but will not have enough time to count the separate dots.

b. Using the backs of the *Pattern Number Cards*, show the numerals 1 to 7 in random order and have pupils produce the number-word card for each numeral.

c. Have *all children* work with appropriate number games. See *Teachers' Edition* pages 15-25. Selections may be made from the following, with groups not exceeding 7: *Climb the Ladder* (1), (2); *Cross the River* (1), (2), (3); *Dominoes* (1), (2); *Fish* (1), (2); or *Fish with Bait*; *Hooked* (1), (2); *Numberland* (1), (2); *Old Hat* (1), (2), (3), (4), (5); *Out of Order* (1), (2) [Adapted also to number words]; *Over Orange* (1); *Spin It* (1), (2); *The Wizard* (1), (2), (3); *Zooks*.

Pupil's Objectives: (a) To review the pattern and numeral for 8; (b) to learn to write the numeral 8 and recognize the corresponding number word *eight*; and (c) to review the work in telling time on the hour as far as 8 o'clock.

New Words: *eight, o'clock*

Teacher's Preparation. Have available all materials used in the work on the previous page. Also have available a classroom clockface with movable hands.

Pre-book Lesson

1. Have pupils put in the wall pocket chart the standard-pattern card for 8, the numeral card for 8, and the number-word card for *eight*.

2. Give several illustrations on the chalkboard to show the way in which the numeral 8 is written.

Book Lesson

Ex. 1. Because the numeral 8 is one of the most difficult for children to write, more practice opportunity has been provided in the pupil's book than was provided for 6 and 7. At the beginning of the first row, call attention to the standard pattern for 8 and the number word *eight*. Then have the children trace over each completed figure 8 in this row. Emphasize the starting point for writing the numeral, the changing directions taken, the point of "cross over," and the ending point. Have the children proceed in a similar way with the dashed 8's in the next row. As pupils work more independently in the third and fourth rows, you will need to help individual children. Some may be helped by placing a *light* dot at the "cross-over" point before starting to write the numeral.

Ex. 2. Pupils are to trace over the numeral 3 and then continue writing the numerals in serial order as far as 8.

Ex. 3. The children are to write the numeral which corresponds to each number word.

Ex. 4. Before engaging in pupil-book experiences with the clocks at the foot of the page, provide some review, using the clockface with movable hands. With this review background, the

children should be able to proceed independently with the exercises at the foot of the page.


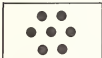
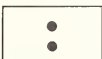


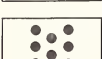
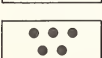
Differentiations and Extensions

1. For *slower learners* who may have difficulty in forming the numeral 8, follow suggestions for extra practice similar to those given for *Book One* page 3 for writing the numerals 6 and 7.

2. For *all pupils*, extend the suggested experiences in connection with *Book One* page 3 to include the standard pattern for 8, the numeral 8, and the number word *eight*.

3. If there is time, you may want to provide for *more capable children* chart experiences through 8 like the sample shown at the left below.





NOTES

	4	seven
	3	eight
	6	four
	8	three
	7	two
	2	five
	5	six

4

Writing 8


1.

	8	8	8	8	8	8
	8	8	8	8	8	8
						
						





2.

1	2	3					
---	---	---	--	--	--	--	--

3.

seven	eight	four	six	eight	five	three	two
							

4.

			
---	---	---	---

5. o'clock — o'clock — o'clock — o'clock

Pupil's Objective. To review work with groups through 5 in terms of their component parts, or sub-groups.

New Words: *part, ring*

Background. For effective quantitative thinking, it is necessary that children be able to interpret a quantity in more than one way. Among other things, it often is desirable to interpret a number such as 5 in terms of sub-groups, or component parts, of which it is composed, such as 3 and 2 or 2 and 3 or 4 and 1 or 1 and 4. The ability to interpret numbers in this way is particularly helpful to a child in his work with the addition and subtraction facts. Experiences with this component idea of number are provided on this page of the work-text and also on *Book One* page 6.

The child is asked first to focus his attention upon the *total group* (on pages 5 and 6 the whole group is ringed with a dashed line) and to identify the size of this whole group. Having done this, he then is asked to direct his attention to each of the parts in turn and to identify their sizes.

Pre-book Lesson

1. Have five children arrange themselves as a group at the front of the class, with three slightly separated from the other two. Then say: **My, what a fine group of helpers I have! How many helpers do I have in this whole group?** After the pupils respond "five," say: **Now I want part of this group to help me straighten the books on the shelves. I would like Tommy, Sally, and George to help me with this. How many**

children are in the part of the group that will help straighten the books? After pupils say "three," then go on: **Now I will need the other part of the group to help me give out some papers. How many children are in the part of the group that will help me distribute the papers?** After the response "two," conclude by saying: **Let's tell this number story again. How many children are there in the whole group? (5) How many children are in the part of the group that will help straighten up the books? (3) ... distribute the papers? (2)**

2. In a similar way, use the following groups and sub-groups, or parts: A group of 4 in parts 2 and 2; a group of 3 in parts 2 and 1; a group of 4 in parts 1 and 3.

3. Write the capital letters A and B on the chalkboard about three feet apart and high enough to be over the head of any child who may stand in front of either letter. Say: **Let's play a game about a group and its parts. I would like Tommy and Sally and George and Betsy and Albert to come up here first. Now I want you to stand this way.** Arrange the children so that four are grouped together under the capital letter A with the other child standing under B. Now ask the children in the class: **How many children are in the whole group? (5) How many children are in the part of the group at A? (4) How many children are in the part of the group at B? (1)**

Write the word *part* in front of each letter. If no one can identify this word, tell them what it is, mentioning specifically that it now says on the chalkboard *part A* and *part B*. Say to the children: **Now let's tell our story about the whole group and its parts once more. How many children are in the whole group? How many are in part A? How many are in part B?**

4. Repeat this type of activity with other groups of three or four or five children.

Book Lesson

Ex. 1. Have the children open their work-texts to page 5 and then say: Each of these pictures shows a group and its parts. Then say: **Look at the first picture. See the dashed ring around the whole group of monkeys. How many monkeys in all are in the ring? (4) Trace over the dashed numeral that tells us that there are four in the ring. Now look at the monkeys at A. How many monkeys are there in part A? (2) Trace over the dashed 2 to tell that there are 2 monkeys in Part A. How many monkeys are there at B? (2) Trace over the dashed 2 to tell that there are 2 monkeys in part B. Then repeat: How many monkeys are in the ring? How many in part A? How many in part B?**

Ex. 2. In a similar way use Ex. 2 for illustrative purposes.

Ex. 3-6. Look ahead with the children to the Ex. 3-6 on this page. Call to their attention that Ex. 3 and Ex. 4 are to be done in the same way in which we have done Ex. 1 and Ex. 2. In Ex. 5 and Ex. 6 point to the fact that instead of finding how many there are *in the ring*, pupils first find how many there are *in all*, which means the same thing. Then have the children work independently on the four exercises, Ex. 3-6.

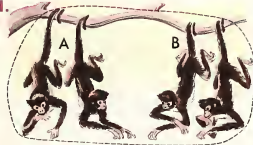
Differentiations and Extensions

1. If any children encounter difficulty with Ex. 3-6, have them "dramatize" each of the different exercises by playing that they are squirrels. Group them at the front of the room in the same manner as is done in the Pre-book Lesson. First discuss the different groupings orally with the children and then relate them to the written symbolism in the work-text.

2. Have *more capable children* count all the animals on this page to emphasize that, as animals, they can be counted together.


5

A Group and Its Parts

1. 

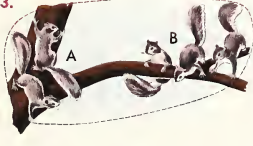
4 in the ring

2 in part A 2 in part B

2. 

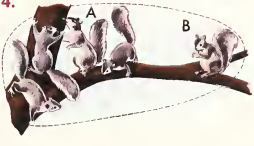
— in the ring

— in part A — in part B

3. 

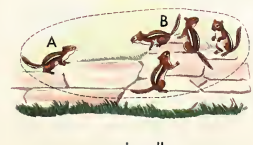
— in the ring

— in part A — in part B

4. 

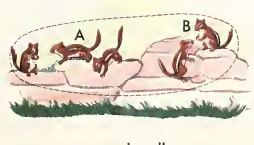
— in the ring

— in part A — in part B

5. 

— in all

— in part A — in part B

6. 

— in all

— in part A — in part B



Pupil's Objective. To review further the work with groups through 5 in terms of their component parts.

New Words: group, whole

NOTES

Background. The basic activity involved in this page is similar to that of the preceding page. However, there are differences in the way in which the child is asked to record the story about a group and its parts. This will be evident as you view the work-text and will account for a slightly different approach to the activity from that taken on *Book One* page 5. Note especially the final short way in which the whole and its parts are recorded in this kind of frame: $\underline{3} \mid \underline{2}$ and $\underline{1}$. This is an especially convenient form to use.

Pre-book Lesson. With groups of pupils or of objects, use interchangeably the wordings "in the ring," "in all," and "in the whole group" so that different wordings in the text will not seem new when on *Book One* page 6 pupils see "___ in all" and "___ in the whole group." Go still further with chalkboard work and use the form $\underline{3} \mid \underline{2}$ and $\underline{1}$, making it clear that this form gives us a short way of recording the size of the whole group and the sizes of its parts.

Book Lesson

Ex. 1. Have the children look at the first picture on *Book One* page 6. Then ask: **How many bicycles do you see in the ring?** (5) **How many bicycles are there in all?** (5) **Do you see the dashed 5 that has been written below the bicycles to tell us that there are five in all?** Trace over this numeral with your pencil. . . . The bicycles in the ring are grouped to show what parts of 5? (4 and 1) **Do you see the dashed 4 and the dashed 1 that have been written to tell us that these are the parts in the picture?** Trace over the dashed 4 and the dashed 1. . . . Now let's tell this story again about 5 and its parts. **How many bicycles are there in all?** (5) **What are the parts of 5 shown in the picture?** (4 and 1)

Ex. 2-4. In a similar way, work with the children on Ex. 2-4. In Ex. 3 and 4 pupils now meet the written expression, "___ in the whole group," but they should not be upset by it.

Ex. 5-10. In Ex. 5-10, pupils will need to use the new method of recording the size of the group and the sizes of its parts. However, with the preparation in the Pre-book Lesson, they should now be able to use the form intelligently.

Differentiations and Extensions

1. If some children need additional experience at the oral and manipulative levels, the following procedures might be used:

a. Have three or four or five of the *more capable* children arrange themselves in various sub-groups. Then have the *slower learners* tell the story about each group and its parts, both orally and with written number symbols.

b. Have *more capable* children arrange groups of three or four or five familiar objects in various sub-groupings. Then have *slower learners* tell the story about each group and its parts both orally and in terms of written number symbols. When children express their stories in written form, have them use the style that was developed on *Book One* page 6 in Ex. 5-10.

2. Have the *more capable* children use pictures of representative materials (dots, squares, triangles, etc.) to make up exercises similar to Ex. 10 in the work-text. In each instance the size of the total group should not exceed 5, and the two component parts should be clearly separated but enclosed by a dashed line as in the work-text exercises. Use these exercises with *slower*

learners who may need additional practice of the kind which makes use of the short recording form.

6	
More about a Group and Its Parts	
<p>1. $\underline{5}$ in all $\underline{4}$ and $\underline{1}$</p>	<p>2. ___ in all ___ and ___</p>
<p>3. ___ in the whole group ___ and ___</p>	<p>4. ___ in the whole group ___ and ___</p>
<p>5. $\underline{3} \mid \underline{2}$ and $\underline{1}$</p>	<p>6. ___ and ___</p>
<p>7. ___ and ___</p>	<p>8. ___ and ___</p>
<p>9. ___ and ___</p>	<p>10. ___ and ___</p>



Teaching Book One Page 7

Pupil's Objective. To review the addition process and the addition facts with sums to 5.

New Words: *find, together*

Background

Addition is a *combining* process. In an addition situation we know at the outset the size of each of two (or more) groups and wish to determine the size of the single group formed when these groups are put together, or combined. In this sense, addition may be thought of as a *regrouping* process.

Note the following developmental features of the Book Lesson:

1. The two-picture sequence in Ex. 1 highlights the combining nature of the addition process.
2. In Ex. 2-5 the combining action is suggested by the one picture but the groups must be "thought" together rather than seen together. "Thinking the groups together" may be facilitated by the encircling technique.
3. The method of recording the "put-together" stories becomes progressively more mature, or abstract, in a planned series of steps.

Pre-book Lesson

1. Have 5 children form two sub-groups at the front of the room, with 3 in one group and 2 in the other. Have the two sub-groups distinctly separated from each other. Ask the class to tell how many there are in each of the two small groups. Then have the 2-group join the 3-group. Ask the class to tell how many

children there are all together. Finally have the class tell the put-together story in the following way:

3 children and 2 children are 5 children.

2. Repeat with several other groupings, such as: 4 children and 1 child; 2 children and 2 children; 1 child and 3 children.

3. Next put 2 books in one pile and 3 in another. Ask the class to tell how many books are in each pile. Then have one child put the 3 books with the 2 books. Ask the class how many books there are in all. Finally have the class tell the put-together story: *2 books and 3 books are 5 books.* Then have them tell it the short way: *2 and 3 are 5.*

4. Repeat with several other groupings.

5. Finally, arrange groups of buttons or other counters, as was done with children and with books. Ask similar questions of the class, before and after one small group is combined with the other. Each time, have the final put-together story expressed orally, as for instance: *2 and 2 are 4.*

Book Lesson

Ex. 1. Call attention to the 2-picture sequence at the top of the page. Have the children identify and record the number of dogs in each group in the first picture. Also have them notice that the 1 dog is running toward the 3 dogs. Have pupils read the statement under the second picture. Then, in the second picture, have the children tell how many dogs there are all together. Finally, have the pupils complete the put-together story.

Ex. 2-3. In each instance have the children identify and record the number in each group. Then have the children encircle both groups in one ring and find how many there are all together. Finally, have pupils complete and read the put-together story. In reading each story, have the children read it in relation to the pictured situation even though the words do not appear in print. For example, in Ex. 2, the children may read: *2 dogs and 2 dogs are 4 dogs*, as well as simply *2 and 2 are 4.*

Ex. 4-5. Have the children proceed in the same manner as in Ex. 2-3. However, have them give special attention to the introduction of the equals sign in each example. After each put-together story is written with *and* and *are* in Ex. 4-5, it is rewritten in a new way using the equals sign. Call attention to the meaning of the sign. You may wish to have your pupils read the equals sign as "equal," but it is probably better to delay this reading until you have had a chance to do more work on equality. So in Ex. 4: *1 and 2 are 3* and *1 and 2 = 3* are both read as "One and two are three."

Differentiations and Extensions

1. Provide practice for *all children* to rewrite put-together stories using the equals sign. You can have the children rewrite each story in Ex. 1-3 using the equals sign. Additional experiences are included on *Book One* page 8, so this is sufficient "extra practice" at this point.

2. If *slower learners* appear to have difficulty in Ex. 2-5 in comprehending "togetherness" of the two groups, have them represent each situation with suitable counters and actually move the designated groups together in each instance.

NOTES

7

Finding How Many All Together

1.



$\underline{3}$ dogs

$\underline{1}$ dog

Find how many dogs all together.

3 dogs and 1 dog are $\underline{4}$ dogs.

2.



$\underline{2}$ dogs

$\underline{2}$ dogs

Find how many all together.

2 and 2 are ____.

3.



$\underline{3}$

$\underline{2}$

Find how many all together.

3 and 2 are ____.

4.



Find how many all together.

1 and ____ are ____.

1 and ____ = ____.

5.



Find how many all together.

4 and ____ are ____.

4 and ____ = ____.



Pupil's Objective. To continue review of put-together stories with special attention to the use of the equals sign in writing these stories.

Background. *Book One* page 8 is substantially an extension of page 7. In this instance, however, after the first two exercises the word *are* is no longer used in writing put-together stories. It is replaced completely by the equals sign.

Book Lesson

Ex. 1-2. The first two exercises at the top of *Book One* page 8 are similar to the last two exercises at the bottom of page 7 in that the put-together story is written in two ways: first using the word *are*, and then using the equals sign in place of *are*. Note, however, that the size of each of the two component groups is not written separately, as before, but appears only as a part of the complete number story. For Ex. 1 and 2, have the children follow these steps:

- Identify the size of the left-hand group.
- Identify the size of the right-hand group. (They should note that the animals in the right-hand group are coming together with the other group.)
- Draw a ring around all the animals to emphasize the togetherness.
- Find how many there are all together.
- Write the number story in the two forms shown.

Give special attention to the reading of the second form of the number story, having children read the equals sign as *are*.

Ex. 3-8. With the children, look at the remaining pictures and exercises on this page. Talk about these pictures, being certain that children understand that in each case they are to follow steps *a-e* listed above. If necessary, use Ex. 3 for illustrative purposes. Then have children work the remaining exercises independently. Circulate among the children to be certain that they understand what is to be done.

Since this concludes the first systematic experience the children have had with the equals sign, it would be very advantageous to have children read the number stories they have written. Begin with Ex. 3 and have selected children read aloud their number stories for each of the several exercises, reading the equals sign always as *are*.

Differentiations and Extensions

1. If you feel that some of the *slower learners* need additional experiences with this kind of work, you will want to prepare your practice materials carefully. For one thing, your pictorial representations should be dynamic in nature. Each picture should show one group in the process of joining another group. You may find it helpful to use gummed seals depicting various kinds of animals to make up pictorial representations of the desired nature. Each of these pictures could be used repeatedly if the child makes his written record at the chalkboard or on a separate sheet of paper. If need be, go back as far as Ex. 4 and 5 on *Book One* page 7 to assist children with recording their number stories in the proper way. Work ultimately toward the single record that is used in Ex. 3-8 on page 8.

2. If you feel it necessary to go back to an even lower level of dynamic action, use some of the *more capable children* to act out various put-together situations in which one group of children actually joins another group. Have the *slower learners* tell each number story orally and also write it in one or two forms on the chalkboard.

LOOKING AHEAD

Looking-Ahead oral experiences will be inserted from time to time so that you can give your pupils oral developmental experiences to prepare them for written experiences to come later in the program. The sections below provide oral manipulative experiences with more than one group of 10.

Have available ten bundles of 10 sticks (dowels, tongue depressors, or the like).

1. Have the children count progressive bundles of 10 in the following way:

- Show one bundle of 10 and have the children say, "One group of 10, or 1 ten."
- Add another bundle of 10 and have the children say, "Two groups of 10, or 2 tens."
- Continue through ten bundles of 10, or 10 tens.

2. Tell the children they are going to begin to learn new names for the groups they have just been working with.

- Show six bundles of 10. Solicit from the children, or tell them if necessary, that another name for 6 tens is *sixty*. Point to the similarity between the expressions *six tens* and *sixty*.
- Treat 70, 80, 90, and 40 in a similar manner.
- Now work with the numbers 30, 50, and 20, pointing to the variation in expression for *thirty*, *fifty*, and *twenty*.
- Show 10 tens and emphasize its special name, *one hundred*.
- Provide experience with bundles of 10 which now build the sequence of number names in their serial order: *ten*, *twenty*, *thirty*, and so on.

8

Put-Together Stories

1.



$\frac{3}{3}$ and $\frac{2}{2}$ are $\frac{5}{5}$
 $\frac{3}{3}$ and $\frac{2}{2}$ =

2.



— and — are —
 — and — =

3.



— and — =

4.



— and — =

5.



— and — =

6.



— and — =

7.



— and — =

8.



— and — =

Pupil's Objective. To extend work with the addition process and the addition facts by introducing the plus sign in the recording of put-together stories.

New Words: *put, stories*

Background. The work of the previous page provided experience in using the equals sign. Page 9 introduces use of the plus sign (the *and* sign). It is important that children look upon this sign as a substitute or "shorthand," for the word *and*. This special symbolic way of indicating that two groups are to be thought of collectively, in terms of a number representing the total, is especially appropriate at this point because the pictures and representations in themselves do not suggest any idea of combining or putting together. This action must be *imagined* by the child. It is in this connection that the plus sign has an especially significant meaning in that it is our unique mathematical way of telling the child that two groups are to be thought of as though put together even though this is not apparent from any pictorial representations.

Pre-book Lesson

1. On the chalkboard, draw a group of three circles and a group of two circles, slightly separated, to represent two groups of marbles. Beneath these groups write the expression:

— and — = —

2. Say to the children: **For several days we have been writing put-together stories about things we have done and pictures we have seen. In each of the pictures we knew that**

groups were being put together. Now look at the picture of the marbles on the chalkboard. Does this picture show us that the groups are to be put together? After pupils respond, then say: **I want you to think that the two groups are being put together. Can you do this?**

After you have had some discussion of "thinking groups together," refer again to the picture on the chalkboard and say: **How many marbles are in the group at the left? (3) ... at the right? (2) Now suppose we make believe that we are putting the 2 marbles with the 3 marbles. Suppose we think that we are putting the groups together. How many marbles will we have all together? (5) Now suppose you help me write the number story. (Fill in the blank spaces on the chalkboard with the appropriate numerals.)**

3. Say to the children: **Now we want to learn a new way to write this same number story using the *and* sign instead of *and*.** (Beneath the statement you have written on the chalkboard, write $3 + 2 = 5$.) **We read what I have just written the same as before: 3 and 2 are 5.**

4. Use several additional illustrative examples as may be needed.

If you feel it advisable, you may use real objects in addition to the chalkboard picture to represent each of the put-together situations you work with, but it is a primary purpose of this work to have the child *think* the groups together. For those children who appear to need help, as it were, in *thinking* groups together, you may have them either draw a ring around both sub-groups, as was done on previous pages, or encircle concrete representative objects with their hands.

Book Lesson

Ex. 1. Have the children refer to Ex. 1 on this page. In the Pre-book Lesson you have virtually established the pattern of thinking and writing to be used in this and other exercises on the page. Consequently, you should encounter no difficulty in having children understand what is to be done here and in working through this first exercise with them.

Ex. 2-9. If necessary, use Ex. 2 for illustrative purposes also. Otherwise, have the children work independently on this and the subsequent exercises on the page. However, before permitting them to go ahead independently, direct pupils' attention to the other exercises. Have them see that when writing the put-together stories about the batons in Ex. 7-9, they are to write each put-together story in only one way; that is, only in the new way using the *and* sign.

Ex. 1-3 (foot of page). Be certain that the children understand that the three exercises at the bottom of the page are handled in the same way as the preceding nine, even though the pictures are of representative items.

Circulate among the children as they are working independently, offering appropriate assistance as you may detect need for such.

Differentiations and Extensions










1. If *all pupils* appear to need further practice in writing put-together stories this new way, you may want to prepare practice sheets using pictures of representative items similar to the last three exercises on this page of the work-text.

2. You may wish to have some of the *more capable* children make pictures of sub-groupings similar to those at the bottom of the work-text page. These could be used as additional practice material for *slower learners* who need further experiences of this type.

9

More Put-Together Stories

Make the put-together stories.

<p>1.</p>  <p>$\frac{2}{2} \text{ and } \frac{2}{2} = \frac{4}{2}$</p> <p>— and — = —</p> <p>— + — = —</p>	<p>2.</p>  <p>— and — = —</p> <p>— + — = —</p>	<p>3.</p>  <p>— and — = —</p> <p>— + — = —</p>
<p>4.</p>  <p>— and — = —</p> <p>— + — = —</p>	<p>5.</p>  <p>— and — = —</p> <p>— + — = —</p>	<p>6.</p>  <p>— and — = —</p> <p>— + — = —</p>
<p>7.</p>  <p>— and — = —</p> <p>— + — = —</p>	<p>8.</p>  <p>— and — = —</p> <p>— + — = —</p>	<p>9.</p>  <p>— and — = —</p> <p>— + — = —</p>

Make the put-together stories.

<p>1.</p>  <p>— and — = —</p> <p>— + — = —</p>	<p>2.</p>  <p>— and — = —</p> <p>— + — = —</p>	<p>3.</p>  <p>— and — = —</p> <p>— + — = —</p>
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Pupil's Objectives: (a) To reproduce groups of representative items and write in the new way the put-together stories for the groups; and (b) to use these skills to help solve problems.

New Word: draw

Background. Frequently, pupils must reproduce representations of groupings as an aid in solving problems. In Ex. 1-9 on *Book One* page 10, the child is asked to reproduce two groups of representative items and write the corresponding number story.

In the final three exercises on this page, opportunity is provided to use this new ability of representing groups in connection with simple problems which you will dictate.

Book Lesson

Ex. 1. Have the children look at Ex. 1. Say: **In this first box, we are told to "Draw 2"; to "Draw 1." It's easy to draw rings. Trace over the two dashed rings shown. Then trace over the one dashed ring. What is the word between the 2 rings and the 1 ring?** After pupils answer "and," say: **Let's write the number story that tells us how many we have in all when we think 2 rings and 1 ring together. Trace over the dashed figure 2 and the dashed figure 1. What numeral will we put in the blank space?** (3) **Now let's read this story together: 2 and 1 are 3.**

Ex. 2-9. In a similar manner, use Ex. 2 and 3 for illustrative purposes if this appears to be necessary. Then have the children work independently down through Ex. 9.

Ex. 1-3 (foot of page). Next say: **Look at the 3 empty boxes at the bottom of the page. I'm going to tell you a little number story. You will draw a picture of the story in the first empty box. Then we'll write the number story about that picture.**

Ralph had 1 small marble and 4 large marbles. How many marbles did he have all together?

Let's draw a picture about this story. Draw a ring at the left side of the box to show the 1 small marble. Now, write the word *and* just after the ring we drew. (Show on the chalkboard what is to be done.) Now draw 4 rings to show the 4 large marbles. Now let's find how many marbles Ralph had all together. Write the put-together story just below our picture this way. (First put on the chalkboard beneath the picture the following blanks: $\underline{\quad} + \underline{\quad} = \underline{\quad}$. Then fill in the blank spaces so that the story reads: $1 + 4 = 5$.) **Now let's read this put-together story together: 1 and 4 are 5.**

For the second and third boxes, use the following stories:

For box 2:

Jack had 3 freight cars and 2 passenger cars for his train. How many cars did Jack have all together for his train?

For box 3:

Alice had 1 book. Joe had 3 books. How many books did Alice and Joe have all together?

Differentiations and Extensions

1. For this page, the principal source of difficulty will be the problem work and, in this connection, the use of drawings of representative items. You may have to work with *slower learners* specifically on the idea that we can let something such as a ring *stand for* the object we are talking about. If necessary, use manipulative materials to help children grasp this idea. For example, have 5 children stand in a line in back of a table. Put a small block or counter in front of each child. Have the children

see that there is one block for each child. Move on to the idea that we could let each block *stand for* a child. We have as many blocks as there are children. If the children were not there, we could count the blocks and tell how many children the blocks stand for.

2. The *more capable children* in your class may do some work in making up problems. As you observe them, have one pupil make a problem for one of the first nine exercises, and have another pupil work it.

LOOKING AHEAD

In these Looking-Ahead activities you may want to do some readiness work with pairs of addition facts in preparation for the more systematic study of this idea on *Book One* pages 27-28.



1. For instance, use Ex. 1 on *Book One* page 10 in the following way. Ask the children: **What would have been our put-together story if we first drew 1 and then drew 2?** Write the story on the chalkboard, along with the one written originally for Ex. 1. Discuss the similarities and the differences between the two stories.

2. Have the pupils look at Ex. 2. Ask them to find another exercise where they first drew 2 and then 3 more (Ex. 6). Compare the two put-together stories, discussing similarities and differences as before.

3. Proceed in the same way with Ex. 3 (coupled with Ex. 5) and Ex. 8 (coupled with Ex. 9).

10

Drawing Pictures for Put-Together Stories

1. Draw 2. Draw 1.  and  $\underline{2} + \underline{1} = \underline{\quad}$	2. Draw 3. Draw 2. _____ and _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	3. Draw 4. Draw 1. _____ and _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
4. Draw 2. Draw 2. _____ and _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	5. Draw 1. Draw 4. _____ and _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	6. Draw 2. Draw 3. _____ and _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
7. Draw 1. Draw 1. _____ and _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	8. Draw 3. Draw 1. _____ and _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	9. Draw 1. Draw 3. _____ and _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$

1. _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	2. _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	3. _____ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
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Pupil's Objectives: (a) To review the patterns and numerals for 9 and 10; and (b) to learn to write the numerals 9 and 10 and recognize the corresponding number words *nine* and *ten*.

New Words: *nine, ten*

Teacher's Preparation. Have available all materials used previously for teaching *Book One* page 3.

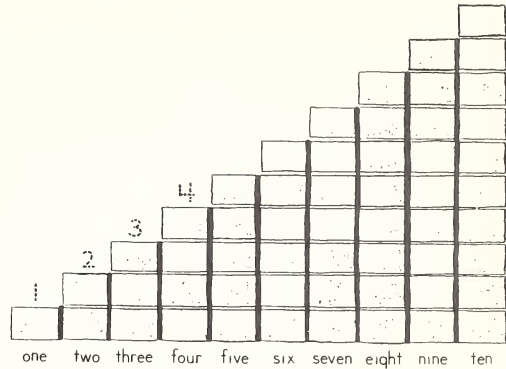
Pre-book Lesson

1. Have pupils put in the wall pocket chart (see Teaching *Book One* page 3) the standard-pattern card for 9, the numeral card for 9, and the number-word card for *nine*. Also show on the chalkboard the way in which the numeral 9 is written.

2. Proceed in a similar way, having pupils put in the wall pocket chart the standard-pattern card for 10, the numeral card for 10, and the number-word card for *ten*. When you show children how to write the numeral 10, it is necessary to deal with its two-part formation: a combination of the 1 and the 0.

Book Lesson

Ex. 1-2. Refer to the first row of 9's and of 10's, calling attention to the standard patterns and the number words *nine* and *ten*. Have the children proceed with the experiences in learning to write the numerals 9 and 10, first tracing over the dashed figures, then using the dot and arrow helpers only, and finally writing the numerals with the sole help of the guide lines. Be sure to circulate among the children as they work, giving guidance and assistance as needed. In doing the last two rows of practice in



Ex. 2, be certain that each of the two figures comprising the numeral 10 is written entirely separate from the other figure but sufficiently close to the other so that 10 is seen as a numeral.

Ex. 3. The children are to write the numeral corresponding to each given standard pattern or number word. Note that emphasis is placed on numerals learned most recently.

Ex. 4. The children are to trace over the 5 and then continue writing the numerals in serial order through 10.

Differentiations and Extensions

1. For *slower learners* who may have difficulty in forming the numerals for 9 and 10, use either or both of the following:

a. Cut numerals from sandpaper, mount them on cards, and have the children trace over the sandpaper numerals with their fingers in the same manner as for writing the numerals.

b. Provide extra-practice sheets with work similar to that in the pupil's book on writing 9 and 10.

2. Have *all pupils* engage in the following experiences:

a. Using the *Pattern Number Cards*, show patterns for groups to 10 in random order and have children tell "how many" in each group shown. Show each card only briefly, so that pupils will have enough opportunity to sense the form of the pattern but will not have enough time to count the separate dots.

b. Using the backs of the *Pattern Number Cards*, show the numerals 1 to 10 in random order and have pupils produce the number-word card for each numeral.

c. Have *all children* work with appropriate number games which may be selected (see *Teachers' Edition* pages 15-25) from among the following: *Climb the Ladder* (1), (2); *Cross the River* (1), (2), (3); *Dominoes* (1), (2); *Fish* (1), (2); *Fish with Bait*; *Hooked* (1), (2); *Numberland* (1), (2); *Old Hat* (1), (2), (3), (4), (5); *Out of Order* (1), (2) [Adapted also to number words]; *Over Orange* (1); *Spin It* (1), (2); *The Wizard* (1), (2), (3); *Zooks*.

3. For *more capable children*, prepare and use a work sheet similar to the one suggested on Teaching *Book One* page 4, extending the material to include patterns, words, and numerals for 9 and 10. You may wish to eliminate the boxes for 1, 2, and 3.

4. Have *all children* tell you about groups of things up to 10, writing on the chalkboard the numeral that tells the size of the group they are talking about.

5. Copy the diagram above on the board or duplicate it for *all pupils*. The brick stairway is to be completed by writing at the top of each column the number of bricks in that column.

11

Writing 9 and 10

	9	9	9	9	9	9	9
nine							
nine							
nine							

	10	10	10	10	10	10	10
ten							
ten							
ten							

				seven	ten	nine	eight
7							

3	4	5					
---	---	---	--	--	--	--	--



Pupil's Objective. To study the teen numbers, 11–19, especially in connection with grouping the ten.

Background. This is the first of a four-page sequence which provides systematic instruction relating to the teen numbers and their structure. The importance of a group of 10 in our number system cannot be emphasized too strongly. We must be careful not to assume that children more or less inherently or automatically will think of numbers larger than 10 in terms of the 10-group.

Teacher's Preparation. From oak tag or similar material, cut out 10 cards each approximately 5 inches square. On each of the cards write one of the numerals 11 through 20. These cards will ultimately be displayed along your chalk tray so be sure to make the numerals sufficiently large.

Pre-book Lesson

1. Arrange 10 chairs in pattern fashion (4, 3, 2, 1) at the front of the room. Have 10 children come up and sit in these chairs. Then ask the class: **How many children are there here at the front of the room? (10) Now we are going to play a game called "Ten and Some More."**

Have 1 more child come to the front of the room and stand just to the right of the group of 10 (that is, on the right from the point of view of the class). Now say: **Who can use 10 to tell me how many children are at the front of the room now? (10 and 1)** Then write "10 and 1" on the chalkboard about a foot above the chalk tray. Ask: **Who knows another number name we could use to tell how many children are at the front of the room now? (eleven)** Then holding the pack of cards for the teen numerals, ask: **Who thinks he can find the numeral for eleven in this pack of cards?** When the proper numeral has been selected, show it and then place it on the chalk tray right below the "10 and 1" you wrote there. Bring out the fact that we can tell in two ways how many children are at the front of the room. We can say that there are "10 and 1" or we can say that there are "11." Also call attention again to the numeral 11.

2. Proceed in a similar way to build meanings for the numbers 12, 13, 14, 15, 16, 17, 18, and 19. *Do not go on to 20 at this time.* Where appropriate, call attention to the similarity between the name of the teen number (for example, 16) and the name of the related number (6).

Book Lesson

Ex. 1–8. Ask the children to look over the first eight exercises to see if they can find something that is the same in all the pictures — the *ten* children in a ring. Then have pupils look specifically at the first box. Point out that the picture shows 10 and 1, that "10 and 1" has been written underneath the picture to tell how many children there are, and that the numeral 11 has been written in dashed form as another way of telling how many. Have the children trace over the dashed numeral 11. Treat Ex. 2 in a similar manner.

In Ex. 3 have the children tell that there are 10 and 5. Then have them write the numeral 5 in the blank space to tell that there are 10 and 5. Finally call attention to the dashed symbol for 15 and have the children trace over it. If necessary, use Ex. 4 as another illustrative example. Then have the children work independently on Ex. 5–8.

Below the red boxes. Have the children look at the abstract exercises at the bottom of the page, moving down each of the three columns. In each instance have pupils read the expression, such as "10 and 1," and the related number symbol. Then have

them trace over this dashed symbol. It is important to move down through each column in this exercise so that the numerals 11–19 will be treated here in their serial order.

Differentiations and Extensions

1. If you feel that some of your *slower learners* may be doing the abstract work at the foot of the page in a manner not as meaningful as it should be, work with them individually or in small groups. For each part of the exercise at the foot of the page, have them try to find the corresponding pictorial representation in the exercises immediately above. (17 is missing.)

2. Have the *more capable children*, or *all pupils*, work in pairs on a matching game. Have one child make up a set of small cards, writing on each an expression such as *10 and 1*, *10 and 2*, *10 and 3*, etc. Have the other child make up a set of cards, copying the numerals 11, 12, 13, etc., on his cards. The first child selects from his pack a card with the expression such as *10 and 4* on it and places it face up on the table. Then the other child should match this with the appropriate numeral from his pack of cards.

3. To extend experience 2 above, you may wish to have *more capable children* make a set of pictorial representations similar to those in the first eight exercises on *Book One* page 12, putting a different representation on each card. These could then be used in connection with the card sets suggested in item 2 and three children could play the matching game.

12		
10 and Some More		
1. 10 and 1		
2. 10 and 4		
3. 10 and —		
4. 10 and —		
5. 10 and —		
6. 10 and —		
7. 10 and —		
8. 10 and —		
10 and 1		10 and 4
10 and 2		10 and 5
10 and 3		10 and 6
		10 and 7
		10 and 8
		10 and 9



Pupil's Objective. To extend the study of the teen numbers in order to develop the idea of place value as it is used in our system of notation.

Background. *Book One* page 13 extends the work on page 12 in several ways. First, greater emphasis is given to the *unity* of the group of 10. Second, pictures of representative items gradually replace pictures of real objects. Third, specific attention is directed to the idea of place or position in our system of notation.

Teacher's Preparation. You will need to have at hand: 20 pencils; 18 dowel rods or lollipop sticks or tongue depressors or the like that can be used in a representative manner; rubber bands for holding together bundles of 10; the tens and ones *Number Pockets* (see *Teachers' Edition* page 14).

Pre-book Lesson

1. Show the children 15 pencils, arranged as a bundle of 10 (bound together by a rubber band) and 5 more. Have the 10 and 5 more arranged with the bundle of 10 on the children's left and the other 5 pencils at the right. After pupils tell you that there are 10 and 5, or 15, guide them to express the number also as 1 ten and 5 ones, or 15. Now ask: **Which figure in 15 tells us that we have 1 ten? . . . Which figure in 15 tells us that we have 5 ones?**

2. Do the same with 18 dowel sticks or tongue depressors. Now show the children the tens and ones *Number Pockets* and ask where you should place the bundle of 10 sticks and where the 8

single sticks. Direct specific attention to the fact that we have a place for tens and a place for ones; that we put the bundles of 10 at the left and the 1's at the right. Relate this idea to the numeral 18, emphasizing that the digit at the left tells us how many tens we have and the digit at the right tells us how many ones. Repeat this for other teen numbers so that pupils will think the ten without counting and will see place emphasized over and over.

3. Give some special attention to the representation and structure of 20. First show it in the tens and ones *Number Pockets* as 1 ten and 10 ones. Lead the children to see that if they have 10 sticks in the pocket for ones, there are enough ones to make another bundle of 10. Therefore, 20 should be shown simply as two bundles of 10, or 2 tens.

4. Represent the number 16 in the accepted way in the *Number Pockets*. Then show on the chalkboard the representative symbolism we may use to write this same idea: $\Phi |||||$. Explain to the children that the new symbol Φ is what we write to stand for a bundle of 10. Use other numbers for additional illustrative purposes.

Book Lesson

Ex. 1-5. With the material covered by the Pre-book Lesson as background, pupils should have virtually no difficulty with the first five exercises on *Book One* page 13, because the representations move from pictures of real objects to pictures of representative objects to the special written representations for tens and ones. The ones are in pairs for ease of counting.

In Ex. 4 note that we use representative objects, as pupils are now to think "1 ten" instead of "10", and in Ex. 5 move to the new form of expression for the 10-bundle, the special symbol Φ .

Red boxes. The remaining ten exercises appearing in the two columns at the foot of the page are similar. A dashed numeral is given in the upper left corner of each box. First, the child is to trace over the figures which make up this numeral. Then he makes a representative picture to show the structure of the number represented by the numeral, a 10-bundle symbol and 1 or more ones. Then, he writes in the blanks at the foot of the box a 1 to show that there is 1 ten and another figure to show how many ones. Although special attention was given to the numeral 20 in the Pre-book Lesson, you may wish to call special attention to it again in this section.




Differentiations and Extensions

1. If some of your *slower learners* have difficulty with page 13, it most likely will be in the last 10 exercises where pupils are asked to reproduce the structure of a given teen number. The *slower learner* may be helped by further practice in which a transition step is taken. For instance, in working with the structure of a number, such as 14, he may be helped by first showing the structure of 14 with the representative objects as a 10-bundle and 4 ones in the tens and ones *Number Pockets*. Then, he can make the symbolic representation in the way shown in the work-text, $\Phi ||||$.

2. You may wish to ask some of the *more capable children* to make pictorial representations, either in terms of manipulative objects in the tens and ones *Number Pockets* or in terms of 10-bundle pictures, for the *slower learners* to work with. By working in pairs, the *more capable child* can make up appropriate pictures and the *slower learner* can tell about the structure of the number in terms of the tens and ones, and also write it in terms of appropriate words and number symbols.

13

Tens and Ones

1.  10 and 5 15	2.  10 and 7 17	3. $\Phi $ 10 and 4 14
4.  1 ten and 6 ones 16	5. $\Phi $ — ten and — ones 13	
$ $ Φ 1 1 ten and 1 one	16 — ten and — ones	
12 $\Phi $ — ten and — ones	17 — ten and — ones	
13 — ten and — ones	18 — ten and — ones	
14 — ten and — ones	19 — ten and — ones	
15 — ten and — ones	20 $\Phi \Phi$ 2 tens	

Pupil's Objectives: (a) To learn the serial order of the numerals through 20; and (b) to understand the relative sizes of the numbers they represent.

New Words: *no, yes*

Teacher's Preparation. Cut from oak tag 20 square cards of such size that ten of the cards will fit in one row of a wall pocket chart (see Teaching Book One Page 3). Number these cards from 1 to 20, making the numerals sufficiently large so that children can see them from the back of the classroom.

Pre-book Lesson

1. Mix up cards 1 to 10 and ask a pupil to place the cards in order in the top row of the wall pocket chart. Then put the remaining 10 cards in random order along the chalk tray. Ask someone to pick out the card that comes next after 10 and place this numeral card in the wall chart directly below the 1. Continue in the same way until the remaining numerals through 20 have been placed in the second row.

2. Talk with the children about the series that appears in the wall chart, bringing out the points indicated below. If children experience any difficulty in sensing these ideas, you may wish to use representative materials to clarify the difficulties.

a. Each number for which the numeral stands is one more than the number before it in the series and one less than the number immediately after it. For example, 15 is one more than 14 and one less than 16.

b. We see that each numeral in the second row is very much like the one just above it in the first row but stands for ten more; or, we can say that each numeral in the second row shows one more 10 than the numeral above it in the first row.

c. By remembering the order of the number names for the numerals in the first row, we are helped to remember the order of the number names for the second row.

3. Turn one of the numeral cards over so that the blank side shows on the wall chart. Then ask one of the children to do two things: first, tell what numeral is missing; then, tell how he knows what the missing numeral is.

Book Lesson

Ex. 1. Refer the children to the number chart at the top of this page and tell the children that they may refer to this chart when they need to in working some of the other exercises on the page.

Ex. 2. For the picture, tell the children that they are going to have to follow a little boy, Billy, from his house (pointing to the numeral 1) to the store (pointing to the numeral 20). He saw so many interesting things along the way that he took a path which jumps pretty much here and there. The children are to start with the numeral 1 and draw lines from 1 to 2 to 3 etc. to show the path that Billy took in going from his house to the store.

Ex. 3. The children are to encircle the word *Yes* or the word *No* to indicate whether there are any pictures of children on the pages indicated. For instance, say: **There is a dashed ring around the word *Yes* immediately after the numeral 12.** To see why, turn to page 12 in your book and notice that there are pictures of children on that page. Trace around this dashed ring. Now look at the numeral 2 below 12. Turn to page 2 in your book to see if there is a picture of children. Circle *Yes* if there is and *No* if there is not. Have pupils continue in this way through Ex. 3. After the illustrative item for page 12, the answers are: 2, Yes; 8, Yes; 13, No; 16, No; 6, No; 11, No; 17, Yes; 7, No; 1, Yes; 20, No; 14, No.

Ex. 4. There are four numerals in each row. The child is to draw a ring around the numeral which represents the largest number in the group of four.

Ex. 5. This exercise is similar to Ex. 4, except that this time the children are to encircle the numeral for the smallest number.

Differentiations and Extensions

1. If you feel that *slower learners* would profit by having more experience in sensing the relation between numerals such as 5 and 15, etc., you may wish to have the *more capable children* and the *slower learners* work in pairs. One child in each pair should prepare a set of ten cards, each card having on it one of the numerals from 1 through 10. The other child should prepare a set of ten cards, each having on it one of the numerals from 11 through 20. To play a game, one of the children may put down a card in his series and the other child must match it with the related card from his set. The children should take turns in playing the first card. The *more capable child* will be able to check correctly on the matching that is made each time.

2. If some of your *slower learners* need further experience of the type provided in Ex. 2, have several of your *more capable children* make up for their use some "pathways" to be followed.

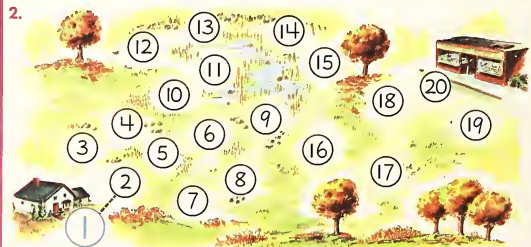
Reminder. Remember to maintain the ability to count by rote as far as 50. Also take advantage of opportunities to have children use orally enumeration to identify and reproduce groups not exceeding 50 as the need arises. Also, when opportunity offers, give attention to the relative sizes of various groups.

14

1 to 20

1.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20



3.

12	Yes	No	16	Yes	No	7	Yes	No
2	Yes	No	6	Yes	No	1	Yes	No
8	Yes	No	11	Yes	No	20	Yes	No
13	Yes	No	17	Yes	No	14	Yes	No

4.

10	12	11	15
13	17	10	8
18	14	16	12
19	7	20	5
13	17	16	11

5.

12	15	11	18
20	10	16	13
14	17	19	15
18	9	12	20
17	11	19	16

New Words: *by, count*

Pre-book Lesson

3. Discuss with the children things within their experience that often are grouped by 2's and could be counted by 2's. If the words *pair* and *pairs* have not entered the discussion earlier, be sure to use them this time: for example, a *pair* of shoes, etc.

Book Lesson

Ex. 1. Have the children look at Ex. 1 and tell them that they are going to practice writing the numerals 11–20. Have them tell you about the left-hand figures and the right-hand figures of

Ex. 2. The pupils look at the first row of numerals. Point to the fact that 10 and 13 have been written in the blank spaces in the first line and have pupils trace over these dashed numerals. Then let the children work independently on the other series in this exercise, in each row writing the required numerals to make a sequential order.

Ex. 4. Explain carefully to the children that in Ex. 4 they are to write in the blank spaces the numerals that would come next when *counting by 2's*. Use the first sequence as an illustration and then permit the children to work independently.

Differentiations and Extensions

1. If *slower learners* need additional practice with any of the experiences provided on this page, you can easily prepare work sheets with material similar to that found in the pupil's book. Encourage *slower learners* who may have difficulty with counting by 2's to use the technique of saying to themselves *all* numbers, emphasizing the even numbers and keeping the odd numbers in the background of their thinking.

2. Your *more capable children* already know the number sequence beyond 20 and have engaged in rote and rational counting experiences beyond this point. Encourage them to extend the ability to count by 2's to groups and sequences beyond 20.

3. Have *all pupils* engage in number games appropriate to this page. The following from the games described on *Teachers' Edition* pages 15–25 would be appropriate at this point: *Connecto*; *Cross the River* (4), (5), (7); with numerals 1–20 only; *Hooked* (5), with numerals 1–20 only; *Moving Man*; *Old Hat* (6), (7), with numerals 11–20 only; *Out of Order* (3), (5), with numerals 20 only; *Over Orange* (6), with numerals 11–20 only; *Postman*; *The Wizard* (4), (5), (6), with numerals to 20.

Reminders

1. Remember to maintain the work done earlier this year in developing ordinals through *fifth*.

a. Have 5 children—each with a different name—form a line at the front of the room. Ask:

Who is *fourth* in line? Who is *first*? etc.

In which place in the line is Mary? In which place is Bill?

b. Use ordered arrangements of other things in the classroom and provide experiences similar to those used previously. Include more than 5 objects upon occasion, but do not use an ordinal word beyond *fifth* at this time.

c. Call attention to other uses of ordinals; for example, the *first, second, third, fourth, or fifth* day of the week or month, etc.

2. Remember also to provide experiences in telling and showing time on the hour. Use a demonstration clockface and, where practicable, the classroom clock. Have children tell and write the time, extended beyond the work of the *Primer* to include 11 and 12 o'clock. Also have the children set the hands of the clock at specified times on the hour, indicated both orally and with written numerals. Here, too, extend the work beyond that of the *Primer* to include 11 and 12 o'clock.

15

Writing 11 to 20

1.

11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

2. 9 10 11 12 13

5 6 7 — —

15 16 _____

10 _____

14 _____

17 19

16 _____ 19 _____

13 14

3. Count by 2's.

2 4 6 8 10
12 14 16 18 20

4. Count by 2's.

2 4 _ _ _

12 14 _____

6 8 _____

8 _____

4 _ _ _ _

10 _____



Pupil's Objective. To review the subtraction process and the subtraction facts with minuends to 5.

New Words: *car, left*

Background

Subtraction, the inverse of addition, is a *separating* process or operation. In a subtraction situation we know two things—the size of a group and the size of one of its parts, or sub-groups. We are to find the size of the other part, or sub-group.

Throughout *Book One* the part to be found always is the part left after a known part of a known group has been “taken away.” Thus, the expression “take away” is an appropriate one for *Book One*.

In dealing with subtraction situations, it is desirable for the children to attend to the following things in the order given: (1) the size of the whole group, (2) the size of the sub-group, or part, that is taken away, and (3) the size of the sub-group, or part, that is left. The activities and the experiences provided in *Book One* are designed with this important sequence in mind.

Pre-book Lesson

1. Arrange 5 children in a group at the front of the room. Ask the class to tell how many children there are in the whole group. Have two of the children leave the group. Ask the class to tell how many children were “taken away.” Then ask the class how many children are left. Finally have the class tell the take-away story in the following way: *5 children take away 2 children is 3 children.*

Repeat with several other groupings, such as,

4 children take away 1 child
5 children take away 4 children
3 children take away 2 children

2. Arrange 5 books in a group on a table at the front of the room. Ask the class how many books are in the whole group. Have a child take away 3 books and put them on a shelf. Ask the class how many books were taken away. Then ask the class how many books are left on the table. Finally have the class tell the take-away story: *5 books take away 3 books is 2 books.*

Repeat with several other groupings, such as,

4 books take away 3 books
5 books take away 1 book
3 books take away 1 book

Book Lesson. Work through each exercise in turn with the children in your class or group, having them fill in the blank spaces with the appropriate numerals. Special things to deal with in each exercise are indicated below:

Ex. 1. Be sure the children understand the function of the two-picture sequence at the top of the page. Using the left-hand picture, have the children first identify and record the number of cars in all. Then direct attention to the 1 car that is moving away. Have the children record that 1 car is “taken away.” Have the children look at the right-hand picture to tell how many cars are left. Have the children record this number left in the complete statement: *3 cars take away 1 car is 2 cars.*

Ex. 2-3. In each of these exercises have the children do the following things in order: Identify and record how many tires in all; identify and record how many tires are being taken away; identify how many tires are left on the pile; finish the take-away story about the tires.

Ex. 4-5. Follow the same steps as in *Ex. 2-3*, but with the following extra step. Each take-away story is to be rewritten in

a form using the equals sign in place of “is.” Call special attention to the use and meaning of this sign. Since it has been used previously in writing put-together stories, its use here will pose no real problem. Have pupils read both *5 take away 1 is 4* and *5 take away 1 = 4* the same way—“Five take away one is four.”

Differentiations and Extensions

1. Have *all pupils* look in magazines for pictures which depict take-away situations. For pictures of total groups not exceeding 5, have the children tell and write the take-away story using the form: take away = . If some pictures involve more than 5, see what *more capable children* can do with the take-away stories for these pictures.

2. Have *more capable children* make up and dramatize take-away stories about cars and tires. Toy cars may be used in the dramatizations. “Play tires” may be made easily from construction paper and used in dramatizations also. *Slower learners* may tell and write the take-away stories that are dramatized.

NOTES

16

Finding How Many Are Left

1.



3 cars in all. Take away 1 car. Find how many are left.
3 cars take away 1 car is 2 cars.

2.



4 in all. Take away 1.
Find how many are left.
1 take away 1 is .

3.



 in all. Take away .
Find how many are left.
 take away is .

4.



 in all. Take away .
Find how many are left.
 take away is .
 take away =

5.



 in all. Take away .
Find how many are left.
 take away is .
 take away =

Pupil's Objective. To continue review of work with the subtraction process and the subtraction facts involving minuends to 5.

Book Lesson

Ex. 1-2 are but slight modifications and extensions of Ex. 4-5 at the bottom of *Book One* page 16. Work through these two exercises with the children. First, have the children identify the number of dolls (or pies) seen in all. Then have the children identify the number of dolls (pies) being taken away and the number of dolls (pies) left. Then have the children record the take-away story in the two forms indicated: first, using "is"; then, using the equals sign.

Ex. 3-8. These exercises can be worked independently by the children after the following instructions:

First find and write how many things in all (cookies, cupcakes, children, books, fish, vases).

Find how many of the things are being taken away.

Find how many of the things are left.

Write the take-away story.

Circulate among the children to be certain that they are working correctly. Forestall any confusion on the following point: In all exercises except Ex. 5, the children shown in the picture merely carry out the separating action and thus are not counted among the things in the group. In Ex. 5, however, all children are a part of the separation situation. You can help by emphasizing strongly in each case that the particular take-away story is about dolls, cupcakes, or whatever.

Differentiations and Extensions

1. Follow the suggestions made for *Book One* page 16.

2. If *slower learners* are confused by the difference between Ex. 5 and the other exercises on this page, try to clarify the difference by actual dramatizations. Have children act out situations similar to Ex. 5, in which all children are involved in the separating situation. Also dramatize situations similar to the other exercises, in which the child merely carries out the separating action. Further clarification can be given if you emphasize, as in Ex. 4, that we are to find and write the take-away story about the "cupcakes."

3. As you work with *all pupils*, ask each to "think aloud" as he works. As he does so, try to determine the level of maturity of his thinking. Primarily, when he writes statements like "4 take away 2 is 2," is he thinking, "4 dolls take away 2 dolls is 2 dolls," or has he moved to the more abstract thought process, "4 take away 2 is 2"?

LOOKING AHEAD

1. You may want to do some oral readiness work on pairs of subtraction facts in preparation for the written work of that nature on *Book One* pages 33 and 34. For instance, in connection with Ex. 3 on *Book One* page 17, have pupils tell what the take-away story would have been if the little girl had taken away 1 cookie instead of the 3 cookies. Write both stories on the chalkboard and discuss the similarities and differences between the two stories.

2. Work similarly with Ex. 4, 5, 6, and 7. For Ex. 5, ask what the story would be if 2 boys had run away instead of 3. Each time, write on the board the number story from *Book One* page 17 and under it the corresponding number story. Study with the pupils the similarities and the differences.

NOTES

17

Take-Away Stories

<p>1.  4 in all 4 take away 2 is ____ 4 take away 2 = ____</p>	<p>2.  3 in all 3 take away 1 is ____ ____ take away ____ = ____</p>
<p>3.  4 in all ____ take away ____ = ____</p>	<p>4.  ____ in all ____ take away ____ = ____</p>
<p>5.  ____ in all ____ take away ____ = ____</p>	<p>6.  ____ in all ____ take away ____ = ____</p>
<p>7.  ____ in all ____ take away ____ = ____</p>	<p>8.  ____ in all ____ take away ____ = ____</p>



Pupil's Objectives: (a) To extend work with the subtraction process and the subtraction facts through situations in which the dynamics of subtraction must be reproduced; and (b) to learn to use the minus sign when recording take-away stories.

Background. It is excellent to use X's at this stage because the technique provides a step toward more static situations—the X's indicate the items to be thought of as subtracted, yet the items are still visually present.

Pre-book Lesson

1. Draw 5 lollipops on the chalkboard. Take away 2 of the lollipops by making X's through them. Have the children tell the take-away story and then write the story on the chalkboard: *5 take away 2 = 3*. Show the children a new way to write the same story: $5 - 2 = 3$. Point out the take-away sign and explain its meaning. Be sure to read the expression as "5 take away 2 is 3."

2. Using a similar procedure, develop the story: $4 - 2 = 2$.

Book Lesson

Ex. 1. Work through this exercise with the children, having them identify the number in the whole group, trace over the X, and then complete the take-away story in the two ways.

Ex. 2. Use this exercise as a second illustrative example. First have the children identify and record how many in the whole group. Then have them take away 2 by making X's on 2 popples. Have them first tell and then record the complete take-away story in the two ways. Emphasize that we read the minus sign as "take away."

Ex. 3-8. Have the children work independently on the remaining exercises on this page. Call attention to the fact that in Ex. 5-8 each take-away story is written now in only 1 way—using the minus sign.

Differentiations and Extensions

1. If *slower learners* need more experience with the "crossing-out" technique and the writing of take-away stories, you may prepare work-sheet material for their use similar to Ex. 5-8 on *Book One* page 18.

2. Have *all pupils* bring to class some pictures of groups not exceeding 5 which they have cut from magazines and newspapers. Then have the children cross out one or more things in a group and tell and write the take-away story about the picture.

3. Have your *more capable children* prepare a bulletin-board display, selecting the best of the above pictures, to show

- The one take-away story about a group of 2: $2 - 1 = 1$.
- The two take-away stories about a group of 3: $3 - 1 = 2$ and $3 - 2 = 1$.
- The three take-away stories about a group of 4: $4 - 1 = 3$, $4 - 2 = 2$, and $4 - 3 = 1$.
- The four take-away stories about a group of 5: $5 - 1 = 4$, $5 - 2 = 3$, $5 - 3 = 2$, and $5 - 4 = 1$.

18

More Take-Away Stories

1.



4 in all. Take away 1.
4 take away 1 = 3
4 - 1 = 3

2.



3 in all. Take away 2.
3 take away 2 = 1
3 - 2 = 1

3.



5 in all. Take away 2.
5 take away 2 = 3
5 - 2 = 3

4.



6 in all. Take away 3.
6 take away 3 = 3
6 - 3 = 3

5.



5 in all. Take away 1.
5 - 1 = 4

6.



4 in all. Take away 2.
4 - 2 = 2

7.



4 in all. Take away 3.
4 - 3 = 1

8.



5 in all. Take away 4.
5 - 4 = 1

Pupil's Objectives: (a) To reproduce subtraction situations with representative items and record the appropriate subtraction facts; and (b) to use these skills to help solve problems.

Background. Now the pupil not only indicates by crossing out that items have been taken away, but he also first reproduces the whole group before performing the take-away activity. The fact that the pupil has to reproduce the entire situation instead of just identifying it means that another step in the learning has been taken and the possibilities are increased that the learning will become permanent. Also, the fact that in the last three experiences this page provides for using the skills in actually solving oral problems makes this page very worth-while.


Pre-book Lesson

1. Have counters of some kind available. Ask a pupil to put 4 of them in a separate group. Then have him cover 1 and tell the take-away story. Have him then duplicate the situation by drawing circles on his paper or on the chalkboard. Have him cross off the 1 taken away and then write the take-away story.

2. To give pupils experience with the idea of drawing circles as representative pictures for real objects, show five marbles and have pupils draw as many circles as there are marbles. Do this with various kinds of items including chairs and pencils which are not round. After some experience with this, you may want to make a few simple problems about one of these groups and have pupils actually make the circles and cross out whatever is to be taken away.

19

Drawing Pictures for Take-Away Stories

1. Draw 4. Take away 1.  $4 - 1 = \underline{\quad}$	2. Draw 5. Take away 3. $\underline{\quad} - \underline{\quad} = \underline{\quad}$	3. Draw 3. Take away 2. $\underline{\quad} - \underline{\quad} = \underline{\quad}$
4. Draw 5. Take away 4. $\underline{\quad} - \underline{\quad} = \underline{\quad}$	5. Draw 4. Take away 2. $\underline{\quad} - \underline{\quad} = \underline{\quad}$	6. Draw 5. Take away 1. $\underline{\quad} - \underline{\quad} = \underline{\quad}$
7. Draw 2. Take away 1. $\underline{\quad} - \underline{\quad} = \underline{\quad}$	8. Draw 5. Take away 2. $\underline{\quad} - \underline{\quad} = \underline{\quad}$	9. Draw 4. Take away 3. $\underline{\quad} - \underline{\quad} = \underline{\quad}$
10. $\underline{\quad} - \underline{\quad} = \underline{\quad}$	11. $\underline{\quad} - \underline{\quad} = \underline{\quad}$	12. $\underline{\quad} - \underline{\quad} = \underline{\quad}$

Book Lesson

Ex. 1. Use this exercise for initial illustration. Have the children follow the steps of the activity by tracing: Draw 4; then take away 1. Then finish writing the take-away story.

Ex. 2. Use this exercise for a second illustration, having the children reproduce this time both the complete representation and the story.

Ex. 3-9. Have the children work independently on these. Circulate among children to give help as needed.

Ex. 10-12. Remind the children that on an earlier page of their books (*Book One* page 10) they drew pictures for put-together number stories which you told them. Now they will do the same thing for some take-away stories. Read the following problems in turn. For each problem the child is to make a representative drawing as he has been doing in Ex. 1-9. Then he is to write the take-away story.

For box 10:

Tom had 4 marbles. (If necessary, tell children to draw 4 marbles in the blank box.) **He gave 1 of them to Jack.** (If necessary, tell children to put an X on 1 marble.) **How many marbles did Tom have left?** (Have children find the answer and write the take-away story.)

For box 11:

Suzanne had 5 balloons. Two of them blew away. How many balloons were left?

For box 12:

Sally had 5 pieces of candy. She gave Ellen 4 of them. How many pieces of candy did Sally have left?

Differentiations and Extensions

1. If necessary, provide more experience with oral problems as in Ex. 10-12. Have each problem dramatized, as well as reproduced. Often the *more capable children* can help *slower learners* to work out their difficulties in this way.

2. It is interesting at this time to have some *more capable children* try to write simple problems and have other *more capable children* draw the representations. A variation is to have them use triangles, dots, lines, and so on, instead of circles for the representations. The whole point is that, as long as the number of items is the same in the representation as in the problem, the number work can be done.

Reminder. Remember to maintain the children's ability to identify single objects cut into halves and to identify each of the two equal parts as one half.

Cut some objects into two and more parts,—sometimes equal parts, sometimes not. Also show pictures or diagrams of single objects and geometric figures cut in these ways. Emphasize that an object has been cut into halves only when (a) it has been cut into two parts, and (b) the parts are of equal size. Also emphasize that a part of an object may be called *one half* only when it is one of the two equal parts of the object.

NOTES



Pupil's Objective. To extend through 30 the study of numbers in relation to the decimal base of our number system and the idea of place value.

New Words: *finish, numbers*

Teacher's Preparation. You will need to have at hand: 30 pencils; 30 dowel rods or lollipop sticks or tongue depressors or the like that can be used in a representative manner; rubber bands for holding together bundles of 10; the tens and ones *Number Pockets* (see *Teachers' Edition* page 14).

Pre-book Lesson

1. Show the children 25 pencils, arranged as 2 bundles of 10 (each 10 bound by a rubber band) and 5 more. Have the 20 and 5 more arranged with the bundles of 10 on the children's left and the other 5 pencils at the right. After pupils tell you that there are 20 and 5, or 25, guide them to express the number also as 2 tens and 5 ones, or 25. Now ask: **Which figure in 25 tells us that we have 2 tens? . . . Which figure in 25 tells us that we have 5 ones?**

2. Do the same with 28 dowel sticks or tongue depressors. Now show the tens and ones *Number Pockets* and ask where you should place the bundles of 10 sticks and where the 8 single sticks. Direct specific attention to the fact that we have a place for tens and a place for ones; that we put the bundles of 10 at the left and the 1's at the right. Relate this idea to the numeral 28, emphasizing that the digit at the left tells us how many tens we have and the digit at the right tells us how many ones. Repeat this for other numerals so that pupils will think the tens without counting and will see place emphasized over and over.

3. Give some special attention to the representation and structure of the number 30. First show it in the *Number Pockets* as 2 tens and 10 ones. Lead the children to see that if they have 10 sticks in the pocket for ones, there are enough ones to make another bundle of 10. Therefore, 30 should be shown simply as three bundles of 10, or 3 tens.

4. Represent the number 26 in the *Number Pockets*. Then show on the chalkboard the representative symbolism we may use to write this same idea: $\Phi \Phi || || ||$. Remind the children that the symbol (Φ) is what we write to stand for a bundle of 10. Use other numbers for additional illustrative purposes.

Book Lesson

Ex. 1. For each representation, have the children write how many tens and how many ones there are and trace the numeral.

Ex. 2. Have the children trace the numeral associated with each representation. Remind them of the way we write the 10-bundle. In preparation for Ex. 3, where pupils themselves are to make the 10-bundle, Ex. 2 uses the written form.

Ex. 3. Have the children draw the representation associated with each numeral. Now they are to make the 10-bundle in the abbreviated form.

Ex. 4. Here the children are to write the structure of each number in tens and ones.

Ex. 5. Here the children trace the numeral corresponding to each statement of structure.

Differentiations and Extensions. Have all *pupils* build a chart showing in serial order the structure of the numbers 21 to 30 beginning in this way:

21	2 tens and 1 one	$\Phi \Phi $
22	2 tens and 2 ones	$\Phi \Phi $
23	2 tens and 3 ones	$\Phi \Phi $

and so on.

LOOKING AHEAD

Children have had experiences with the cent, the nickel, and the dime in the *Primer* program. The present work will serve to maintain and extend abilities with coins and their values in anticipation of written work on *Book One* page 57.

1. Show the children 1 cent (coin). Have them tell you its name and use. Ask the children to tell things they have bought for 1 cent.

2. Show 2 cents, 3 cents, 4 cents, and 5 cents in turn. Each time have the children tell how much money you are showing and things they have bought with that amount.

3. Show the children the 5 cents. Also show them 1 nickel. Ask them the name of the new coin and its relationship to the 5 cents. Emphasize that the nickel is worth just as much—and will buy just as much—as the 5 cents.

4. Write each of the following on the chalkboard: 1¢, 2¢, 3¢, 4¢, and 5¢. Call attention to the cent sign and how it is read. Help the children to understand that "5¢" could mean either 5 cents or 1 nickel.

5. Show the children a dime. Have them tell its value and write 10¢ on the chalkboard. Emphasize that 1 dime is equal to 10 cents (coins) or 1 nickel and 5 cents or 2 nickels.

6. Set up a "play" store. Mark or tag the objects to be sold with the following prices: 1¢, 2¢, 3¢, 4¢, 5¢, 10¢. Have the children take turns serving as clerks while others make purchases. Each child selects the object he wishes to buy and gives the clerk the correct amount in real or "play" coins.

20

More Tens and Ones

1. Finish the work.

	2 tens and 5 ones	25
	___ tens and ___ ones	27
	___ tens	30

2. Finish the numbers.

$\Phi \Phi $	24
$\Phi \Phi $	28
$\Phi \Phi $	26

3. Draw Φ 's and I's.

21	$\Phi \Phi $
20	
25	

4. Finish the work.

26	2 tens and 6 ones	30	___ tens
24	___ tens and ___ ones	28	___ tens and ___ ones

5. Finish the numbers.

2 tens and 7 ones	27	1 ten and 3 ones	13
2 tens and 3 ones	23	2 tens and 6 ones	26
1 ten and 8 ones	18	2 tens and 9 ones	29
2 tens and 5 ones	25	2 tens and 4 ones	24

Pupil's Objectives: (a) To extend through 30 the reading and writing of numerals; (b) to learn their serial order; and (c) to understand the relative sizes of the numbers they represent.

New Word: *write*

Teacher's Preparation. Display a class number chart similar to the one at the top of *Book One* page 21.

Book Lesson

Ex. 1. Provide various oral experiences with the number chart at the top of the *Book One* page and with the class number chart. Activities such as the following are appropriate.

a. Have the children read the numerals to 30 in sequential order as they appear on the number chart.

b. Point to a specific numeral in the class number chart. Have children put a finger on the same numeral in the number chart on *Book One* page 21 and name it.

c. Cover one of the numerals on the class number chart and have the children tell you which numeral you have covered.

d. Ask the children what comes after a specific numeral, what comes before a specific numeral, and what numeral comes between two specific numerals.

e. Supplement the class number chart with bundle representations as needed to develop the following idea: As we look down any *column* on the chart, each numeral stands for a value 10 more than the numeral just above it in the chart. For example, 13 means 10 more than 3, and 23 means 10 more than 13.

f. Ask which of two specified numerals on the number chart

stands for the larger value and which the smaller value. Ask which of three specified numerals stands for the largest value and which the smallest. In connection with this activity, be certain to use, among others, the numerals having the same figures or digits but in reverse order, such as 12 and 21.

Ex. 2. The children are to write the numerals 21 to 30. This experience is similar to the one called for on *Book One* page 15 for writing the numerals 11 to 20 and should pose no problem.

Ex. 3. The children are familiar with the idea of completing a number sequence by writing the missing numerals and thus should find no difficulty with this exercise.

Ex. 4. In the left-hand part of Ex. 4, the children are to draw a ring around the numeral having the *largest* value in each row of four. In the right-hand part of this exercise, the children are to draw a ring around the numeral having the *smallest* value in each row of four. Use the first row in each part of the exercise for illustrative purposes. Then have the children work independently.

Ex. 5. This exercise maintains the work developed on the previous *Book One* page (20).

Differentiations and Extensions

1. If *slower learners* need additional practice with any of the experiences provided on this page, you can easily prepare work sheets with material similar to that found in the pupil's book—confining the activities to the kind(s) on which children need additional practice.

2. Have *all children* engage in appropriate number games associated with the abilities developed on this page of the pupil's book. The following games on *Teachers' Edition* pages 15–25 would be appropriate at this point: *Connecto*; *Cross the River* (4), (7), with numerals 1–30 only; *Hooked* (5), with numerals not exceeding 30; *Old Hat* (6), (7), with numerals not exceeding 30; *Over Orange* (6), with numerals not exceeding 30; *The Wizard* (4), (5), (6), with numerals not exceeding 30; *Who am I?* adapted to appropriate number relations.

3. Provide the following for *all pupils*: Make copies of a *blank* chart starting like the one at the top of *Book One* page 21 but having 100 squares in all (10 rows of 10 squares each). Then have each child write on his chart the numerals to 30. The chart should be kept in a safe place by each pupil for later use when he will write in other numerals as they are introduced in the pupil's book.

4. Have your *more capable children* work with exercises like those in Ex. 4, except that in each row of numerals the children are to do two things: draw a single ring around the smallest numeral and draw a double ring around the largest numeral in the same group of four.

5. You may wish to have *more capable children* turn to the number chart at the top of the *Book One* page and put a ring around each number we say when counting by 2's, thus extending the ability for these children to count by 2's as far as 30.

Reminder. Remember to provide maintenance of the ability to count by rote as far as 50. Also continue to take advantage of opportunities to have children use enumeration (rational counting) to identify and reproduce groups not exceeding 50 as the need arises. Also, when opportunity offers, give attention to the relative sizes of various groups.

21

I to 30

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

2.

21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

3. Write the numbers.

16	17	18	19	—
22	23	—	—	26
10	—	—	—	—
26	—	—	—	—
—	20	—	22	—

4.

4	6	9	2	17	24	5	12
5	11	8	13	10	30	20	1
16	15	17	7	22	11	19	28
29	19	30	20	5	15	22	14

5. Write the numbers.

2 tens and 1 one

2 tens and 5 ones

2 tens and 8 ones



Pupil's Objective. To learn about groups as large as 5 in terms of component parts stated in two ways.

New Word: *yellow*

Pre-book Lesson

1. Have 4 children—3 girls and 1 boy—sit in a group at the front of the room. Be certain to have the 3 girls seated together at the boy's right and facing the class. Ask the class the following questions: **How many children are there in all?** (4) **How many are girls?** (3) **How many are boys?** (1) **Does 4 have the parts 3 and 1?** Then ask: **How many are boys?** (1) **How many are girls?** (3) **Does 4 have the parts 1 and 3?**

2. Have 5 other children—3 boys and 2 girls—sit in a group at the front of the room. Be certain to have the 3 boys seated together facing the class at the girls' right. Also write on the chalkboard these two bracket forms one above the other:

	and
	and

Ask the class or group the following questions: **How many children are there in all?** (5) **How many boys are there?** (3) **How many girls are there?** (2) **Does 5 have the parts 3 and 2?** Then at the chalkboard, using the first of the brackets you have put there, remind pupils how we write that 5 has the parts 3 and 2: 5 | 3 and 2. Emphasize that the 5 tells the size of the whole group, and that the 3 and 2 tell the sizes of the parts. Then ask these questions: **How many girls are there?** (2) **How many boys are there?** (3) **Does 5 have the parts 2 and 3?** Then at the chalkboard, using the other bracket, show how we write that 5 has the parts 2 and 3: 5 | 2 and 3. Discuss with the children the relationship between the two statements that have been written. Bring out the idea that we can tell about a group and its parts in two ways.

Book Lesson

Ex. 1-2. In each exercise, first have the children identify and record how many there are in the whole group. Then read through the remaining statements with the children. When working with the statement in symbolic form, 5 | 2 and 3, have the children say: "5 has the parts 2 and 3." Emphasize that the two "stories" about a group and its parts really say the same thing but in different ways, or in a different order.

Ex. 3-4. Use these examples for further illustration. Work through each exercise with the children, being certain that they understand what to record and where. Notice that two statements now are written from the initial identification of the size of the total group and the size of each of its two parts. Emphasize the way in which each statement is to be read and the relationship between the statements.

Ex. 5-6. Have the children work independently on these exercises.

Differentiations and Extensions

At this point, concentrate on special needs for *slower learners*. (Suggestions for *all pupils* and for the *more capable children* are more appropriate following the teaching of *Book One* page 23 and are given at that time.) If *slower learners* have difficulty in sensing the relationship of parts to the whole in some of the exercises, have them show the groupings in Ex. 3-6 on *Book One* page 22 with counters of appropriate colors to correspond with the work-text groupings. Then, after the size of the whole group has been

identified, let them separate the group into its parts by actually moving the counters of one color slightly away from those of the other color. Help these children to see that it does not matter in which order we talk about or write about the parts; the story about the group and its parts means the same thing stated either way.

NOTES

22

Two Ways to Tell about a Group and Its Parts

1.



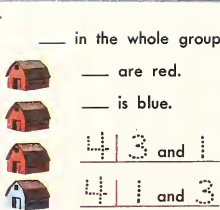
— in all
2 are red. 3 are blue.
5 | 2 and 3
3 are blue. 2 are red.
5 | 3 and 2

2.



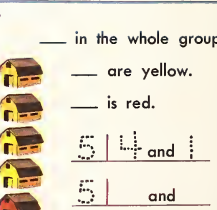
— in all
2 are red. 1 is green.
3 | 2 and 1
1 is green. 2 are red.
3 | 1 and 2

3.



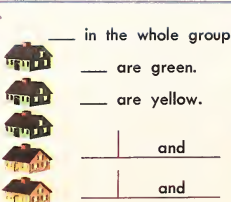
— in the whole group
— are red.
— is blue.
4 | 3 and 1
4 | 1 and 3

4.



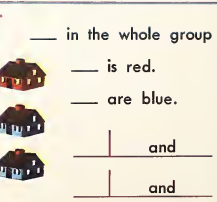
— in the whole group
— are yellow.
— is red.
5 | 4 and 1
5 | 1 and 4

5.



— in the whole group
— are green.
— are yellow.
— and
— and

6.



— in the whole group
— is red.
— are blue.
— and
— and

Pupil's Objective. To learn more about groups as large as 5 in terms of component parts stated in two ways.

Background. This material moves the child toward greater independence in dealing with a group and its parts. Notice that in Ex. 1-2 the child records the number in the whole group at the outset but does not record the number in each part at that time. The record of the size of each part appears only in connection with the parts story. Then in Ex. 3-8 there is no initial recording of the size of the total group, as in Ex. 1-2. Also, Ex. 3-5 show groupings of real objects, whereas Ex. 6-8 show groupings of representative items. Finally, notice that in Ex. 9-10 special consideration is given to the two situations where only one "parts" story is in order.

Book Lesson

Ex. 1-3. Work through these exercises with the children for illustrative purposes. In Ex. 1-2, after the children have identified and recorded the size of the total group, have them identify and tell the size of each part before moving hastily to the parts stories. In Ex. 3, ask these questions and have the children respond orally before they attempt to write anything: **How many are there in the whole group? How many are there in the one part? How many are there in the other part?** Note that the order in which children answer the last two questions is of no real consequence, although generally it is expected that the left-hand part will be identified first and the right-hand part second. This is not obligatory, however.

Ex. 4-8. Have the children work independently on these exercises. Suggest that for each exercise the children ask and answer silently the questions you asked in connection with Ex. 3.

Ex. 9-10. Have the children work these exercises independently. Then discuss each exercise orally with the class, leading to an understanding of why there is but one "parts" story to be written in each case.

Differentiations and Extensions

1. If *slower children* need further practice experience, you can duplicate work sheets with activities similar to those in Ex. 6-8 on *Book One* page 23. If desired, these activities can be modified to include as a helper the initial line "___ in the whole group," as in Ex. 1-2.

2. Have *all pupils* bring in pictures from magazines and newspapers that show a group and its parts. Have the children tell the "parts" stories about the pictures they bring in. Most of the children will be able to write the stories as well as tell them.


3. Have *all pupils* participate in one or more of the following games (see *Teachers' Edition* pages 15-25) relating to work with a group and its parts: *Climb the Ladder* (3); *Fish* (3); *Over Orange* (2); and *The Wizard* (7).

4. Have more capable children play the game of *Who Am I?* (see *Teachers' Edition* page 23) adapted to the idea of a group and its parts. For example, the child who is *It* might say: "Who am I? My parts are 2 and 3 or 3 and 2."

5. Have *more capable children* complete exercises such as the following, using dot pictures as helpers where needed but without the helping dot pictures wherever possible:


23

More about a Group and Its Parts

1. 


3 in the whole group

3	2	and	1
3	1	and	


2. 

___ in the whole group


		and	
		and	

3. 


4	3	and	
4		and	

4. 


		and	
		and	

5. 


		and	
		and	

6. 

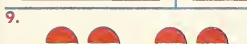
		and	
		and	

7. 


		and	
		and	

8. 

		and	
		and	

9. 

		and	
--	--	-----	--

10. 

		and	
--	--	-----	--

4	3	and	
4		and	

NOTES



Pupil's Objective. To summarize the statements about the parts of groups through 5 in a systematic and organized manner.

Background. Too often we fail to bring together into a systematic pattern the variety of experiences children have been having. Yet the essence of mathematical thinking is systematic pattern. Furthermore, such systematic abets recall, use of relationships, and generalizing.

Note especially that the summary on this page provides the foundation for all the addition and the subtraction facts studied up to this time because all of them depend on knowledge of the numbers 2 to 5 and their parts. Also, this page provides excellent summarizing experiences that serve as readiness for studying pairs of addition facts and pairs of subtraction facts. In this connection, this page helps establish the idea that some addition facts and some subtraction facts do not have another fact to go with them.

Pre-book Lesson

1. Draw 5 simple flowers in a row on the chalkboard. Make the 3 on the left solid white and the 2 on the right solid red (or use other appropriate contrasting colors). At the right-hand end of the row make a triangle as on *Book One* page 24 and in it write 5, to designate the whole group. Then beside it write the parts as 3 and 2 emphasizing that we usually write the size of the left-hand group first and the size of the right-hand group second. Then show the children how we can make a simple representative drawing to show that 3 and 2 are parts of 5:



2. Continue with other groups not exceeding 5.

Book Lesson. In each exercise the child is to do two things: (a) Identify and record the parts of the group as shown by color in the picture at the left; and (b) reproduce the related parts by making a representative drawing.

Ex. 1-3. Work with the children through Ex. 1-3 as illustrative examples. In each case, the whole is recorded in the triangle. The pupil is to record the parts (left-hand part first) and then make a representative drawing. Have pupils actually draw over the dashed circles and vertical lines of the drawing to be sure that they understand what to do. Call attention to the heavier horizontal red lines which separate the "parts" stories for one whole group on the page from those for another.

Ex. 4-10. Have children work on Ex. 4-10 independently.

Differentiations and Extensions

1. If *slower learners* have any difficulty in grasping what is to be done, supplement the work in the pupil's book with actual manipulation of representative objects. For example, place a group of 5 things in a row and, with finger or pencil or ruler, show how 4 and 1 can be shown as 3 and 2, and so on.

2. Have *all pupils* sense and identify "parts" stories that could be related as was done on *Book One* pages 22-23; for example, Ex. 2 and 3, Ex. 4 and 6, Ex. 7 and 10, Ex. 8 and 9.

3. For *all pupils* give attention to the relation between the parts of each number. For example, see if some child can tell for 4 and its parts that one part decreases by 1 each time while the other part increases by 1:

- 4 3 and 1
- 4 2 and 2
- 4 1 and 3

Use manipulation as suggested in item 1 to clarify this relation if necessary.

4. Have *more capable children* try to find relationships from *Book One* page 24, such as:

a. For a group of 3, there are two addition (or subtraction) facts; for a group of 4 there are 3 addition (or subtraction) facts; and so on.

b. How many addition (or subtraction) facts will there be for a group of 6? for a group of 7? and so on.

c. For groups of 3 and of 5 all facts can be arranged in pairs.

d. Would they expect that all facts for 7 could be arranged in pairs?

5. Have *more capable children* attempt to write in abstract form only, all "parts" stories possible about each group from 2 to 5, without reference to any form of representation.

Reminder. Remember to have your children identify common measuring instruments—when shown the actual instrument or a picture of the instrument—and tell everyday uses for each instrument. Also have the children tell which instrument would be needed for a particular use.

24

What Are the Parts?

1.		2	___ and ___	
2.		3	___ and ___	
3.		3	___ and ___	
4.		4	___ and ___	
5.		4	___ and ___	
6.		4	___ and ___	
7.		5	___ and ___	
8.		5	___ and ___	
9.		5	___ and ___	
10.		5	___ and ___	

Pupil's Objective. To see how well the number abilities developed during the first period of instruction in *Book One* have been learned.

Background. Because *NUMBERS WE NEED* builds constantly the ability to do independent seat work, it is possible actually to have evaluation that requires pupils to work independently. This testing of several things on one page provides the best kind of evaluation of the thoroughness of learning. This is so because the ability to handle several kinds of activities on one page indicates firmness of understanding of each activity.

Book Lesson. All activities are familiar to the children. Go over the page with them, being certain that they know what is to be done in each exercise. Then have them work independently.

Ex. 1-3. Write the two stories about a group and its parts. Before this row is started, you may want to remind pupils of the frame used in *Book One* to record a number and its two parts.

Ex. 4-6. Write the put-together story for each picture.

Ex. 7-9. By crossing out, take away the indicated part of the group and write the resulting take-away story for each picture.

Ex. 10. Write the time shown on each clock.






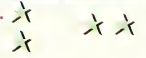







Ex. 11. Finish each sequence involving counting by 2's.

Ex. 12. Draw lines to match the number words with the numerals.

Ex. 13. Show the structure of numbers as indicated in each instance.

25

Do You Know?

<p>1. </p> <table border="1"> <tr><td> </td><td>and</td><td> </td></tr> <tr><td> </td><td>and</td><td> </td></tr> </table>		and			and		<p>2. </p> <table border="1"> <tr><td> </td><td>and</td><td> </td></tr> <tr><td> </td><td>and</td><td> </td></tr> </table>		and			and		<p>3. </p> <table border="1"> <tr><td> </td><td>and</td><td> </td></tr> <tr><td> </td><td>and</td><td> </td></tr> </table>		and			and	
	and																			
	and																			
	and																			
	and																			
	and																			
	and																			
<p>4. </p> <p>— + — = —</p>	<p>5. </p> <p>— + — = —</p>	<p>6. </p> <p>— + — = —</p>																		
<p>7. </p> <p>Take away 3.</p> <p>— - — = —</p>	<p>8. </p> <p>Take away 2.</p> <p>— - — = —</p>	<p>9. </p> <p>Take away 1.</p> <p>— - — = —</p>																		
<p>10. </p> <p>— o'clock</p>	<p>11. </p> <p>— o'clock</p>	<p>12. </p> <p>— tens and — ones</p>																		
<p>13. </p> <p>19</p> <p>— ten and — ones</p>																				

Differentiations and Extensions

1. Diagnose pupil strengths and weaknesses on the basis of this test. Group children for reteaching as needed. It is especially important that pupils should be competent in Ex. 1 to 3. This knowledge of the two ways to write the number and its two parts is basic to the study of pairs of addition facts and pairs of subtraction facts that follows after this test.

- You may want to test *more capable children* even further by:
 - requiring them to write in an organized way the numbers 2 to 5 and their parts;
 - having them try to write some addition and some subtraction facts for 6 and for 7; and
 - having them try to show the structure of other numbers, such as 24 and 57, as in the last row of Ex. 13.

LOOKING AHEAD

"Putting 3 Groups Together" receives its first major treatment on *Book One* pages 40-41. The oral Looking-Ahead activities suggested below serve to prepare children for the later written work.

1. Use a two-step problem situation such as the one described below and have the children use representative manipulative materials as needed in connection with their oral responses.

Step 1: Say to the children: **Sally put 2 blue glasses and 1 red glass on the table. How many glasses did Sally put on the table? Tell the number story.** As the oral response is given, write on the chalkboard: *2 and 1 are 3.*

Step 2: Now say to the children: **Sally then put 2 yellow glasses on the table. How many glasses in all were on the table now? Tell the number story.** As the oral response is given, write on the chalkboard beneath the other number story: *3 and 2 are 5.*

Finally say to the children, **Tell me the two number stories we have just found and written** (2 and 1 are 3; 3 and 2 are 5).

2. Select other groupings from among the following for other stories like the one above:

- | | |
|-----------------------|-----------------------|
| 2 and 1, then 3 and 1 | 1 and 1, then 2 and 2 |
| 1 and 2, then 3 and 2 | 1 and 3, then 4 and 1 |
| 1 and 2, then 3 and 1 | 2 and 2, then 4 and 1 |
| 3 and 1, then 4 and 1 | 1 and 1, then 2 and 3 |

Allow children to use representative objects as needed to work out the stories.

Reminders

1. Remember to have your children engage in simple put-together and take-away experiences involving appropriate number combinations. The children's in-school and out-of-school activities are filled with problem-solving situations of the simple put-together and take-away variety. See that you utilize such things to the fullest advantage in developing the children's problem-solving abilities.

2. Remember also to provide oral and manipulative experiences that will maintain the idea of *one more* and *one less*. Use total groups no larger than 10. (See *Teaching Primer* Page 48.)

Discussion of the Second Period of Instruction

Arithmetic Objectives for the Second Period of Systematic Instruction

1. Increased ability to use understandingly words for comparison of sizes and positions and many common quantitative terms other than numbers*
2. Increased ability to read numerals—extended to include those through 60
3. Increased ability to write numerals—extended to include those through 60
4. Increased ability to read number words—extended to include eleven and twelve
5. Increased ability to count by rote—extended as far as 80*
6. Increased ability to use enumeration (rational counting) to identify and reproduce groups—extended to those as large as 80*
7. Increased understanding of the serial order and relative sizes of numbers orally through 80* with written experiences through 60
8. Increased ability to recognize at a glance the size of regularly patterned groups as large as 10
9. Increased understanding and use of ordinals orally through *tenth** with written experiences through *sixth*
10. Increased understanding of the meaning of numbers in terms of the decimal (tens) base of our number system and the notational principle of place value—extended through 60
11. Increased ability to count by rote and to enumerate by multiples with written experiences by 2's to 20 orally by 10's to 100*
12. Increased understanding of coins and the ¢ sign, including the relative value of each coin and the value of commonly used combinations of these coins not exceeding 10¢ orally with cent, nickel, and dime* with written experiences for cent and ¢ sign
13. Increased ability to tell and show time on the hour, extending written experiences with reproduction to include 11 and 12 o'clock
14. Increased ability to recognize common measuring instruments and occasions for their use
15. Increased ability to recognize objects cut into halves and to identify one half of an object*
16. Ability to recognize the circle and the square as these forms are seen in connection with real objects*
17. Increased understanding of groups and numbers in terms of their component parts—extended to include groups as large as 6
18. Increased understanding of the relationship that permits most "stories" about a group or number (as large as 6) and two of its parts to be expressed and written in two related ways
19. Increased understanding of the dynamics of combining and separating, with intelligent control over addition and subtraction facts—extended to include sums and minuends as large as 6
20. Increased ability to read and write addition and subtraction facts—extended to those with sums and minuends as large as 6 in relation to pictured representations and in horizontal form only; and those to 5 in abstract form using +, −, and =
21. Understanding of the relationship that permits most addition facts and most subtraction facts to be written in related pairs, developed in abstract form with sums and minuends as large as 5; and in relation to pictured representations with sums and minuends as large as 6

*These objectives are developed orally only because either the *Book One* pages do not lend themselves as well to the learning in question or the work serves as readiness for written experiences to come later in the program.

22. Progress toward mastery of addition and subtraction facts for sums and minuends as large as 5
23. Ability to combine three groups with sums not exceeding 5, and to read and write (in horizontal form only) addition "stories" involving three addends with sums not exceeding 5
24. Understanding of the relationships involved when 1 is added to a number and when 1 is subtracted from a number*
25. Increased ability to deal with simple problem situations involving combining and separating by using real and representative objects
26. Increased disposition to use, and a stronger habit of using, number in practical ways*
27. Increased possession of desirable emotionalized responses with respect to arithmetic—favorable attitudes, appreciations, and values*

Discussion of the Objectives

If you have read the list of objectives one by one, you must have noted the frequent occurrence of the words "maintain" and "extend" in the statements. We mention the reiteration of these words, and the ideas they refer to, in order to stress the essential continuity of arithmetical learning. No objective, for this or any other period, is wholly attained in that period and henceforward ignored. On the contrary, if an objective is important enough to be mentioned at all as an instructional goal, it is expected that the development involved is a long-time affair. It is expected, too, that when the objective has been attained for a certain purpose, there is need for experiences to maintain it and for other experiences to expand the concept or skill or meaning in question, to further the achievement of other purposes.

Be that as it may, the fact that so many of the objectives for the second period are being only maintained and extended will make it possible to shorten this preliminary discussion.

Objective 1 requires that you review previously taught terms used to compare sizes and to indicate quantity without employing numerals and that you teach more of such terms. Below we are adding a few to those we have already listed.

The following 33 words of the reading vocabulary new to the second period of instruction are not included in the list of comparison and quantitative words suggested for this period:

answers	cover	glasses	penny
bears	cowboys	goes	plates
bicycles	crayons	hens	playing
books	cups	horses	story
boys	dolls	Indians	things
bubbles	eleven	match	twelve
cats	Eskimos	of	way
cent(s)	girls	pair	with
clowns			

The following, then, is the list of comparison and quantitative words or terms assigned to the second period of instruction:

Oral Vocabulary List for Second Instructional Period

beneath	earlier	late	noon
beyond	earliest	later	problem
cupful	evening	latest	underneath
date	foot	midnight	week
dozen	feet	month	year
early			

Objectives 2 and 3 extend the ability to read and write numerals through 60. Appropriate oral experiences, with liberal use of the chalkboard, prior to the use of the work-text, and then the written exercises on *Book One* pages 30 and 31, should make it possible for your pupils to learn easily the few new things they must know in order to extend reading and writing numerals beyond 30, the previous limit.

Objective 4, the ability to read number words, is extended in this period to recognition of the words *eleven* and *twelve* in connection with *Book One* page 37. You may find that many of your pupils are familiar with these words, but this is the time to make sure.

Objectives 5 and 6, the ability to count by rote to 80 and the ability to use counting more widely for identification and reproduction, may well have been realized by many of your pupils before you start the second period of instruction. Children who can count (and enumerate) to 50 (the previous limit) are likely to extend their abilities "on their own"; they enjoy the rhythm of counting and the repetition of "one, -two," and so on, decade after decade. We might safely have set 100 as the limit for rote counting and enumeration for this period, but we have chosen 80 instead. Nothing in the *Book One* program for the second period requires knowledge of the number series beyond 60, and your pupils will probably have few real needs to identify or reproduce groups larger than 80. If they do have such needs, and certainly if they want to go on to 100 or still further, provide whatever help is called for. But be sure that all pupils can count and enumerate to 60 before they come to *Book One* page 30, because at that point they will require this background for the meanings of the new two-place numbers. (Pupils studied only through 30 in the first period.)

Objective 7, increased understanding of the serial order and the relative sizes of numbers, is extended in this period with oral experiences through 80 (to correspond with the limit in this period for rote and rational counting) and with written experiences through 60 only (to correspond with the limit for reading and writing numerals.) The written experiences on *Book One* pages 31 and 39 and the oral experiences suggested in connection with teaching these pages should enable pupils to attain objective 7 with little difficulty.

Objective 8 requires the maintenance of pattern recognition to 10. Throughout this period, especially for the *slower learners*, it will be well to require occasional practice in recognizing regularly patterned groups for the numbers 2 to 10, or at least 5 to 10. This is necessary, in order to encourage children to think of the numbers through 10, not merely as aggregates of separate ones (the serial idea), but as entities or units in themselves (the group idea). For instance, those of your pupils who cannot at once, and without counting, identify the patterns $\cdot \cdot \cdot$ as 5 and $\cdot \cdot \cdot \cdot \cdot$ as 8 need help and practice.

Objective 9, functional knowledge of the ordinals, maintained orally through *tenth* and extended with written experiences through *sixth*, requires that you teach only one new ordinal for recognition, *sixth*. The work-text does not lend itself readily to instruction for this purpose; rather, it will be necessary for you to devise opportunities when the new terms are rather obviously necessary. You will find a reminder about this objective in connection with teaching *Book One* page 37. The series of terms offers few difficulties, since most ordinals end in *-th*, and the ordinal name is so similar to the corresponding cardinal numeral—*sixth* (six).

Objective 10, understanding two-place numbers through 60, begins, so far as the work-text is concerned, with *Book One* page 30. In learning the meaning of the two-place numbers through 30 in the first period of instruction, your pupils will have become familiar with the terms *tens* and *ones* and with the symbol ϕ to

stand for 10. We have already explained fully (in connection with this objective as suggested for the first period of instruction) the importance of understanding the composition of two-place numbers from the standpoint of place-value. If necessary, re-read the material about objective 10 on *Teachers' Edition* page 138.

Objective 11, the ability to count and enumerate by multiples, should be maintained and strengthened when possible in this period of instruction with oral and written experiences for counting by 2's to 20 and with oral experiences only for counting by 10's to 100. Reminders in this connection appear on Teaching *Book One* Pages 26 and 37.

Objective 12, understanding of coins and their values, is to be maintained very largely through orally administered experiences with the cent, the nickel, and the dime and through chalkboard exercises in which the symbol ϵ is used. On *Book One* page 31, some written experiences with the cent and the ϵ sign will serve to check certain of the understandings, and further work in later periods will extend them.

Objectives 13 and 14 have to do with recognition of common measuring instruments and some of the occasions when they are used. It was suggested for the first period of instruction that you give appropriate oral experiences involving real measuring instruments. On *Book One* pages 36 and 37 in this period occur written exercises with the ruler, kitchen scales, grocer's scales, speedometer, the weather thermometer, the measuring cup, the tape measure, the bushel basket, and the clockface. If your pupils are unfamiliar with these instruments as the result of direct experiences, provide such experiences at this time. (You may not be able to furnish grocer's scales, but you can at least direct your pupils to study them and their use the next time they are in food stores.) Note that, in the case of the clockface (*Book One* page 37), the ability to *identify* time on the hour is extended to the ability to show time on the hour by drawing hands on the clockface. See the suggestions for teaching these two *Book One* pages.

Objective 15, the ability to identify halves and one half of an object, is maintained in this period of instruction solely with manipulative activities. A reminder to work with this objective occurs in connection with teaching *Book One* page 36.

Objective 16 involves the ability to recognize both the circle and the square, two of our more common and important geometric forms. At this instructional level the child cannot be expected to learn about these forms in a rigorous geometric sense. However, with manipulative activities for experience, he should be able to distinguish one general form from the other—and from other common geometric forms, such as the triangle—and should be able to recognize each form as it is seen in relation to familiar objects.

Objectives 17 and 18 have to do with the study of the component parts of 6, preliminary to the discovery of the addition and subtraction facts with sums and minuends of 6. After the early thorough work with component parts of groups and numbers as large as 5, your pupils will find it easy to think that 6 is 1 and 5 (or 5 and 1); 6 is 2 and 4 (or 4 and 2); and 6 is 3 and 3. *Book One* pages 42 and 43 bring this into focus with written experiences provided at a slow pace. By this time pupils will find it natural to think in terms of objective 18 that the "story" about a number and its parts can be told and written in two related ways.

Objectives 19 and 20 involve understanding, reading, and writing with symbols the addition and subtraction facts through 6. The objectives are carefully worded: children are to understand the dynamics of combining and separating and to gain intelligent control over the addition and subtraction facts with sums and minuends as large as 6 in relation to picture representations. Mastery is not expected at this time, nor should it be sought. True, in the later *Book One* pages for this period we provide written abstract practice on the facts for 6, but the purpose is to *nudge*

pupils in the direction of mastery and not to force mastery at this time.

Objective 21 calls for understanding of the important generalization that most addition facts and most subtraction facts "go in pairs." We must say "most," because facts such as $2 + 2 = 4$ and $2 - 1 = 1$ have no other facts to make pairs. Briefly, knowledge of the relationship helps in the learning of number facts: if you know one of a pair, you can find its reverse. And many children need this assistance, if for no other reason than to discourage them from empty memorization or counting. But the relationship has other significant implications and applications, beyond assisting in the meaningful learning of number facts.

The generalization represented in the objective is made to grow easily out of knowledge of the component parts of numbers. A beginning is made in this period with the addition facts—only those with sums to 5, which are already pretty well known to your pupils by reason of earlier experiences in this program. (See *Book One* pages 27 and 28.) Next comes the idea as it relates to subtraction, again with the familiar facts—those with minuends to 5 (*Book One* pages 33 and 34). The work with the 5-facts in this period is carried to the abstract stage. Last, after the component parts of 6 have been found, the relationship for the facts with sum or minuend of 6 is applied (*Book One* pages 44 to 46 and 48 to 50). The work with the 6-facts in this period is carried only to the stage where pupils depend on the relation to pictured representations.

Objective 22 calls for mastery of the addition and subtraction facts with sums and minuends to 5. A good deal of time will already have been devoted to the development of the basic understandings of these facts, so that they may be known as meaningful generalizations. In the first period, you were advised toward the end of the period to institute practice on these facts, of which there are ten in addition and ten in subtraction. Written practice is supplied in the section of the work-text for the second period, first, on the addition facts alone (*Book One* page 29), then on the subtraction facts alone (*Book One* page 35), and finally on the facts in both processes together but not mixed (*Book One* page 38). In the case of each child, concentrate practice on the facts he does not know. For example, probably all will know $1 + 1 = 2$, but not all will know $4 - 3 = 1$. The teaching suggestions for the *Book One* pages carry ample suggestions for practice, both in connection with the particular lesson pages mentioned above and in connection with supplementary games and other forms of practice. Remember that nothing less than mastery, the ability to furnish answers quickly and correctly, is acceptable; but remember also that children will move toward this mastery, which

should be accompanied by understanding and confidence, at their own rates.

Objective 23 extends the ability in adding to include *three* digits with sums to 5 (horizontal form only); as, $1 + 2 + 2 = 5$. *Book One* pages 40 and 41 have been carefully designed to show the rationale of this skill; and if the Pre-book Lessons suggested for these pages are followed, your pupils should not have trouble with the skill. The only new element introduced is that of remembering the sum of the first two digits, in order to add the third thereto. By using the introductory work, even this difficulty is avoided.

Objective 24, understanding of the relationships involved when 1 is added to a number and 1 is subtracted from a number, is suggested for beginning oral and manipulative work in this period of instruction, in connection with *Book One* page 43. Written experiences occur on later *Book One* pages. Children will be quick to express the generalizations in their own words, "I just go up one or down one," "It's just like counting one more," and so on. Knowing the generalizations enables the pupil to obtain answers not only for facts within the area he has studied but for any similar addition and subtraction, as $9 + 1 = 10$ and $9 - 1 = 8$.

Objective 25, the ability to deal with simple problem situations, has been a part of the arithmetic program from the outset. The series of lessons in the second period of instruction is designed to extend the ability to deal with such situations by encouraging the use of abstract numerals and the basic operations of addition and subtraction, with less and less reliance on the manipulation of objects. See how your pupils are assisted in this transition. On *Book One* page 26, patterned groups are provided as aids to the solution of the first two orally presented addition problems. Thereafter, dots may be drawn by the children themselves if they need to have some form of concrete picturization. A similar procedure is employed with the first set of oral subtraction problems (*Book One* page 32). For the first set of mixed problems (*Book One* page 38) spaces are available for drawings as needed, but the abstract number facts should be written immediately by children able to do so.

Objectives 26 and 27. At various times we have written much regarding objectives 26 and 27. (See discussion of objectives 23 and 24 on *Teachers' Edition* page 140.) At this time, we only ask, "Are your pupils, on their own, making use of the arithmetic they know for purposes of importance to themselves or do they stop all thought (and use) of arithmetic at the end of each class period? Do your pupils give evidence of knowing that they *should* understand what they learn? Do they ask questions when they do not understand? Are they enjoying their number work?"

Text Pages and Lesson Plans, Book One Pages 26–52

NOTES

Make notes here of the general things you wish to remember while you are teaching the *Book One* pages of this period of instruction.



Pupil's Objectives: (a) To compare the sizes of groups and of objects in the picture as a means of getting acquainted with the page; and (b) to develop the ability to use familiar addition facts in problem situations.

New Words: cups, plates

Background. Specific comparison experiences are included as a part of the oral discussion of the picture at the top of this page (and similar subsequent pages). These experiences are important in their own right in contributing to the development of an important number ability: that of comparing the relative sizes of groups and things. By having these experiences as the opening activity for the lesson, there is greater assurance that the child will have a more thorough familiarity with the quantities in the social situations and thus have a better basis for the problem-solving requirements of the page.

Book Lesson. Talk with the children about the things they see in the picture. In doing so, ask specific quantitative questions, such as:

a. How many plates do you see? How many cups? Are there more plates than cups? (Your more capable children may volunteer that there are two more plates than cups. Accept and praise such a response but do not make exact comparisons of this nature the object of direct instruction at this time.)

b. Look at the knives and the spoons. Which are shorter—the knives or the spoons?

c. What are the tallest things you see on the table?

The problems below are to be read to the children, one at a time. The first two problems may be solved by looking at the picture. The remaining problems have a similar setting but the solutions are not to be found in the picture. Helping representations are shown for the first two problems. Children are to make similar "helping pictures" for the other problems.

For Ex. 1 to 4, just read each problem and have the pupils complete the put-together story. A special instruction is included below for Ex. 5 and 6.

Ex. 1. There are 3 plates on the table. Jane is placing 2 more plates. How many plates will there be on the table in all?

Ex. 2. There are 2 cups on the table. Jill is bringing 1 more cup. How many cups will there be on the table in all?

Ex. 3. On another table there are 2 large plates and 2 small plates. How many plates all together are on the other table?

Ex. 4. On that table there are 2 large cups and 3 small cups. How many cups all together are on that table?

We have given most labels in the problems of *Book One* as plural nouns because singular nouns provide too much help and because many pupils do not need emphasis on finding answers when one of the addends is 1. For Ex. 5 and 6, and for similarly starred problems to be used on later pages, you have two alternatives:

a. If you use the problems as shown (which eventuate in sums larger than those taught to date), challenge the class with the statement that you are purposely making the problems harder in order to see if the pupils can do them. Usually children will have no trouble because if they really understand problem-solving, they can make dot pictures and count.

b. If your class is not ready to transfer learning to larger sums than have been taught, then you should change one of the numerals in each problem to "one" as you read the problem. You may want to warn the pupils to watch for something not quite right or you may want to see how they react if confronted with a plural label when they insert "1."

*Ex. 5. Jane washed 3 large plates and 3 small plates. How many plates did Jane wash?

*Ex. 6. Jill washed 4 big cups and 2 little cups. How many cups did Jill wash?

Differentiations and Extensions

1. Have all pupils make up put-together problems about other things that are or could be on the table—knives, forks, spoons, etc. Tell and write the put-together stories. In order to avoid vocabulary difficulty, use the form: $\underline{\quad} + \underline{\quad} = \underline{\quad}$. Remember to read "and" for + and "are" for =.

2. Use actual dramatization and manipulation for slower learners who may have difficulty in solving problems.

Reminders

1. Remember to provide experiences at various times in dealing with the several abilities associated with the numbers to 30, such as:

- rote and rational counting
- serial order of numerals
- reading and writing numerals
- tens-and-ones structure of numbers
- relative sizes of numbers

Take advantage of opportunities that arise in connection with in-school and out-of-school activities in which the children engage.

2. Remember also to provide appropriate rote and rational counting experiences in connection with counting by 2's to 20.

26

Finding How Many All Together



1.		$\underline{3}$ plates + $\underline{2}$ plates = $\underline{5}$ plates
2.		$\underline{\quad}$ cups + $\underline{\quad}$ cup = $\underline{\quad}$ cups
3.		$\underline{\quad}$ plates + $\underline{\quad}$ plates = $\underline{\quad}$ plates
4.		$\underline{\quad}$ cups + $\underline{\quad}$ cups = $\underline{\quad}$ cups
5.		$\underline{\quad}$ plates + $\underline{\quad}$ plates = $\underline{\quad}$ plates
6.		$\underline{\quad}$ cups + $\underline{\quad}$ cups = $\underline{\quad}$ cups

Pupil's Objective. To study familiar addition stories and facts in related pairs.

New Words: *pair, way*

Background. The previous work with the two ways of stating component parts of groups (*Book One* pages 22–24) paves the way for the study of pairs of addition facts, beginning with *Book One* page 27, and the study of pairs of subtraction facts, beginning with *Book One* page 33. The present work with pairs of addition facts leads into one of the most important generalizations in all mathematics, technically known as the Law of Commutation. In relation to addition, this law states in effect that the order of addends may be changed without changing the sum.

Pre-book Lesson

1. Have 2 girls seated at a table (around which there are 5 chairs). Have 3 boys standing at the chalkboard. Have the 2 girls join the 3 boys. Tell and write the story: $3 + 2 = 5$

Revert to the original arrangement. Now have the 3 boys join the 2 girls at the table. Tell and write the story: $2 + 3 = 5$

2. In a similar manner, put piles of 3 books and 1 book on a table. Have the piles combined in two different ways, leading to the two stories: $3 + 1 = 4$ and $1 + 3 = 4$

Introduce to your pupils the idea that in each instance the two related stories make a *pair* of put-together stories about the same two groups. Lead to the realization that the order in which the groups are put together does not affect the size of the total group.

Book Lesson

Ex. 1–2. Use these as illustrative examples, working through each exercise with the children. All algorithms are familiar, so you can concentrate on these things: (a) thinking the groups together in each of two ways; (b) the resulting *pair* of put-together stories about the same two groups; and (c) the fact that the order in which the groups are put together does not affect the sum.

Ex. 3–5. Have the children work these exercises independently. Have pupils explain why there is but *one* put-together story written in Ex. 5. If they have trouble, restudy with them Ex. 9 and 10 on *Book One* page 23.

Differentiations and Extensions

1. For *all pupils* use some of the magazine pictures, etc., brought in previously as the basis for deriving other appropriate pairs of put-together stories.

2. Ask *all pupils* if they can think of any other put-together situation in which there would be just one story rather than a pair of stories for sums not exceeding 5 ($1 + 1 = 2$).

Reminder. Knowing the sets of components of a number is the key to immediate recall of addition facts and subtraction facts with that number as sum or minuend.

For written practice, whenever there is time, have pupils write “5” (or whatever) and then all of its sets of two components they can think of. As soon as a child knows that 5 has the parts 3 and 2 (among others), he has the basis for immediate recall of the sums for $3 + 2$ and $2 + 3$ and the remainders for $5 - 2$ and $5 - 3$.

Sometimes you may want oral practice of the kind in which you say “4” (or whatever) and pupils give two of its components.

27

Put-Together Stories in Pairs

1.



$$2 \text{ dogs} + 1 \text{ dog} = 3 \text{ dogs}$$

$$1 \text{ dog} + 2 \text{ dogs} = 3 \text{ dogs}$$

The two put-together stories make a pair.

Write the two stories this way.



$$\begin{array}{r} 2 \\ 1 \end{array} + \begin{array}{r} 1 \\ 2 \end{array} = \underline{\quad}$$

2.



$$3 \text{ dogs} + 2 \text{ dogs} = \underline{\quad} \text{ dogs}$$

$$2 \text{ dogs} + 3 \text{ dogs} = \underline{\quad} \text{ dogs}$$

The two put-together stories make a pair.

Write the two stories this way.



$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

3.



$$\begin{array}{r} 1 \\ 4 \end{array} + \begin{array}{r} 4 \\ 1 \end{array} = \underline{\quad}$$

$$\begin{array}{r} 4 \\ 1 \end{array} + \begin{array}{r} 1 \\ 4 \end{array} = \underline{\quad}$$

4.



$$\begin{array}{r} 1 \\ 3 \end{array} + \underline{\quad} = \underline{\quad}$$

$$\begin{array}{r} 3 \\ 1 \end{array} + \underline{\quad} = \underline{\quad}$$

5.



$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

NOTES

Pupil's Objective. To continue and extend the study of familiar addition stories and facts in related pairs.

New Word: *story*

Pre-book Lesson. In connection with the written work of this lesson, your pupils will now for the first time make the + and = signs independently as in Ex. 10-12 they write a complete addition fact. You will want to give some preliminary instruction on the making of these signs so they will be placed correctly in relation to the numerals used.

Book Lesson. The transition from Ex. 3-5 on *Book One* page 27 to Ex. 1-6 on *Book One* page 28 will present no difficulty for the children. On page 28, the variation is that representative drawings replace the pictures of real objects on page 27.

Ex. 1-6. Use Ex. 1 for illustrative purposes. Have the children trace over the numerals shown in the pair of put-together stories about the representative drawing. Then have the children work independently on Ex. 2-6. In each case they are to write the pair of put-together stories for the representative picture.

Note that, in the first statement, pupils will read the picture from left to right as they put groups together but in the second statement they read from right to left. In the beginning work of this type, pupils will now find in each box a gray line which thus slightly separates the second statement from the picture.

Ex. 7-9. Here the child is to draw a representative diagram to show the groups being put together, complete the put-together story that is started, and finally write the related put-together story to make a pair. Use Ex. 7 for illustrative purposes. First, have the child draw a dot picture to show the groups, 1 and 3. Then, have him complete the put-together story about $1 + 3$ and also write the related put-together story about $3 + 1$. Let the children work independently on Ex. 8-9.

Ex. 10-12. Follow a procedure similar to the one above for Ex. 7-9 with these exceptions: If some children are able to complete the given put-together story and write the related story without drawing a dot picture, permit them to do so. By having the dot picture drawn only if needed, you will get an indication of which children can deal with the pairs of addition facts at the higher abstract level. In these exercises also note that the pupil now must make the plus and equals signs as he writes his "other" fact.

Ex. 13-14. Have the children first draw a dot picture and then complete the put-together story in each case. Then have them explain orally why there is but one put-together story for each of these dot pictures.

Differentiations and Extensions

Have 16 cards prepared for playing the game "Pair-O." From heavy stock, cut cards approximately the size of standard playing cards. On each of 10 cards, write one of the following combinations with a blank for the sum:

$$\begin{array}{lll} 1 + 1 = \underline{\quad} & 4 + 1 = \underline{\quad} & 1 + 2 = \underline{\quad} \\ 3 + 1 = \underline{\quad} & 1 + 4 = \underline{\quad} & 2 + 2 = \underline{\quad} \\ 3 + 2 = \underline{\quad} & 1 + 3 = \underline{\quad} & \\ 2 + 1 = \underline{\quad} & 2 + 3 = \underline{\quad} & \end{array}$$

On each of the other 6 cards, make a representative drawing to show any of the following two component parts: 1 and 1, 2 and 1, 3 and 1, 4 and 1, 2 and 2, 3 and 2.

The object of the game is to obtain sets of three related cards (except in the case of the "doubles" where only two related cards make a set). The set should consist of the card showing the

component parts and the two cards which go with it to make a pair of related addition facts.

Shuffle all 16 cards. Deal 4 cards to each of 2 players. Place the remaining 8 cards in a pile between the players, turning the top card face-up beside the other 7 which are face-down. The first player draws either the face-up card or the top card in the face-down pile. Whenever a player can form a related set of cards, he lays the 3 (or 2) cards down in front of him and tells the complete story about the number and its parts and the pair of related addition facts involved. If he tells any part of the story incorrectly, he must give the set to the other player, if the other player can tell the complete story correctly. If neither one can answer correctly, those particular cards are shuffled into the "kitty" pack to come up again in the future. The player collecting the most sets wins the game.

NOTES

28

More Put-Together Stories in Pairs

<p>1.</p> $\begin{array}{r} 3 + 1 = 4 \\ 1 + 3 = 4 \end{array}$	<p>2.</p> $\begin{array}{r} \underline{\quad} + \underline{\quad} = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$	<p>3.</p> $\begin{array}{r} \underline{\quad} + \underline{\quad} = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$
<p>4.</p> $\begin{array}{r} \underline{\quad} + \underline{\quad} = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$	<p>5.</p> $\begin{array}{r} \underline{\quad} + \underline{\quad} = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$	<p>6.</p> $\begin{array}{r} \underline{\quad} + \underline{\quad} = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$
<p>7.</p> $\begin{array}{r} 1 + 3 = 4 \\ 3 + 1 = \underline{\quad} \end{array}$	<p>8.</p> $\begin{array}{r} 2 + 1 = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$	<p>9.</p> $\begin{array}{r} 3 + 2 = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$
<p>10.</p> $\begin{array}{r} 4 + 1 = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$	<p>11.</p> $\begin{array}{r} 2 + 3 = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$	<p>12.</p> $\begin{array}{r} 3 + 1 = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$
<p>13. One story for 2 and 2.</p> $2 + 2 = \underline{\quad}$	<p>14. One story for 1 and 1.</p> $1 + 1 = \underline{\quad}$	

New Words: *cowboys, horses*

Look at the cowboy standing beside his horse. Which is taller—the cowboy or his horse?

The six problems below are to be read to the children. The answers for the first two problems can be found from the picture at the top of the page. The remaining problems have a similar setting but their solutions cannot be found in the picture. In Ex. 1-4, the child is to write the appropriate put-together story by putting the proper numerals in the blank spaces. Note that for Ex. 3 and 4 the labels are not used and in the boxes for Ex. 5 and 6 the pupils will need to write the entire addition fact (including the $+$ and $=$ signs). (Also see the paragraphs preceding Ex. 5 on Teaching *Book One* Page 26.)

*Ex. 6. There were 3 girls and 3 boys playing together outside the corral. How many children were playing together outside the corral?

Ex. 7-9. The child is to write each time the pair of put-together stories derived from the representative drawing. The complete statement of fact is necessary, including the + and = signs. Use Ex. 7 for illustrative purposes, emphasizing that a pair of statements is wanted. Then permit the children to work independently on Ex. 8-9.

Below the boxes. In each part of the exercise at the foot of the page, the child is to use a multiple-choice technique; that is, he draws a ring around the correct numeral of the two given to show the sum. This exercise represents the first experience in *Book One* which the child has had with addition facts in purely abstract form. The level of difficulty of these first abstract experiences is reduced through use of the multiple-choice technique instead of requiring actual recall of the sums. Use the first two examples in the first column for illustrative purposes. Then have pupils work independently. Circulate among the children and observe them carefully, giving help where necessary.

Do You Know These Put-Together Stories?










1. cowboy + cowboys = cowboys

2. horses + horses = horses

3. $\underline{\quad} + \underline{\quad} = \underline{\quad}$ 4. $\underline{\quad} + \underline{\quad} = \underline{\quad}$

5.	6.
----	----

<p>7.  </p> <p>_____</p> <p>_____</p>	<p>8.   </p> <p>_____</p> <p>_____</p>	<p>9.  </p> <p>_____</p> <p>_____</p>
--	---	---

$$4 + 1 = 3 \text{ (5)}$$

$$2 + 3 = 5 \quad 4$$

$$2 + 1 = 3 \quad 4$$

$$1 + 3 = \textcircled{4} \quad 5$$

$$1 + 2 = 4 \quad 3$$

$$3 + 2 = 5 \quad 6$$

$$1 + 1 = 2 \quad 1$$

$$1 + 4 = 5 \quad 3$$

$$2 + 2 = 3 \quad 4$$

$$3 + 1 = 2 \quad 4$$

$$2 + 2 = 5 \quad 4$$

$$2 + 3 = 4 \quad 5$$



Pupil's Objective. To extend through 60 the study of numbers in relation to the decimal base of our system of notation and the idea of place value.

Pre-book Lesson

1. Show the children 45 pencils, arranged as 4 bundles of 10 (each 10 bound by a rubber band) and 5 more. Have the 40 and 5 more arranged with the 4 bundles of 10 on the children's left and the other 5 pencils at the right. After pupils tell you that there are 40 and 5, or 45, guide them to express the number also as 4 tens and 5 ones, or 45. Now ask: **Which figure in 45 tells that we have 4 tens? . . . Which that we have 5 ones?**

2. Do the same with 58 dowel sticks or tongue depressors. Now show the children the tens and ones *Number Pockets* and ask where you should place the bundles of 10 sticks and where the 8 single sticks. Direct specific attention to the fact that we have a place for tens and a place for ones; that we put the bundles of 10 at the left and the 1's at the right. Relate this idea to the numeral 58, emphasizing that the digit at the left tells us how many tens we have and the digit at the right tells us how many ones. Repeat this for other numbers so that pupils will think the tens without counting and will see place emphasized over and over.

3. Give some special attention to the representation and structure of the number 60. First show it in the *Number Pockets* as 5 tens and 10 ones. Lead the children to see that if they have 10 sticks in the pocket for ones, that there are enough ones to make another bundle of 10. Therefore, 60 should be shown simply as six bundles of 10, or 6 tens.

4. Represent the number 46 in the *Number Pockets*. Then show on the chalkboard the representative symbolism we may use to write this same idea: $\Phi\Phi\Phi\Phi\parallel\parallel\parallel$.

Use other numbers for additional illustrative purposes.

5. Write several numerals on the chalkboard and have pupils draw Φ -numbers for them and explain their composition.

Book Lesson

Ex. 1. For each representation, have the children write how many tens and how many ones there are and trace the numeral.

Ex. 2. Have the children trace the numeral associated with each representation.

Ex. 3. Have the children draw the representation associated with each numeral.

Ex. 4. Here the children are to write the structure of each numeral in tens and ones.

Ex. 5. Here the children write the numeral corresponding to each statement of structure.

Differentiations and Extensions

1. Have *all pupils* build charts showing in serial order the structure of the numbers 31 to 40, 41 to 50, and 51 to 60. Begin in this way:

31	3 tens and 1 one	$\Phi\Phi\Phi\mid$
32	3 tens and 2 ones	$\Phi\Phi\Phi\parallel$
33	3 tens and 3 ones	$\Phi\Phi\Phi\parallel\parallel$

2. Additional experiences of the types of exercises on *Book One* page 30 can be provided for *slower learners* who may need them.

3. For *more capable children* develop work like Ex. 4 and 5 on *Book One* page 30 in which upon occasion you inject examples with the tens and ones reversed, such as:

53	___ ones and ___ tens	or	2 ones and 4 tens	<input type="text"/>
----	-----------------------	----	-------------------	----------------------

LOOKING AHEAD

In order to provide Looking-Ahead activities in connection with using the comparative and the superlative in statements about things, you will need (a) groups of 3 similar objects that vary in size in *all their dimensions* as, for example, three tin cans, three books, three blocks; and (b) groups of 3 similar objects that vary in the *dimensions of length only* as, for example, three pencils, three crayons, and so on.

1. Begin with pairs of objects of differing sizes. Ask questions in a variety of terms involving the comparative, such as:

Which is the **bigger** tin can? Which is the **smaller** book?

2. Now use three objects of differing sizes. Ask questions involving superlatives such as the following:

Which is the **biggest** tin can? the **smallest** tin can?

3. Now work with the pencils, the crayons, and so on.

a. When working with *two* objects

Which is the **longer** pencil? Which is the **shorter** crayon?

b. When working with *three* objects

Which is the **highest** can? the **lowest** can?

Which is the **tallest** child? the **shortest** child?

4. Have the children use the comparative and the superlative about things commonly seen in relation to the classroom, as,

John is **taller** than Mary.

Jane has the **longest** pigtails in the class.

30

Tens and Ones Again

1. Finish the work.

	4 tens and 7 ones	47
--	-------------------	----

	___ tens and ___ ones	38
--	-----------------------	----

	___ tens and ___ ones	56
--	-----------------------	----

2. Finish the numbers.

$\Phi\Phi\Phi\parallel\parallel$	34	48 $\Phi\Phi\Phi\Phi\parallel\parallel\parallel\parallel$
----------------------------------	----	---

$\Phi\Phi\Phi\Phi\Phi\parallel$	52	37 <input type="text"/>
---------------------------------	----	-------------------------

$\Phi\Phi\Phi\Phi\Phi\Phi$	60	53 <input type="text"/>
----------------------------	----	-------------------------

3. Draw Φ 's and 1's.

4. Finish the work.

53	5 tens and 3 ones	3 tens and 6 ones	36
----	-------------------	-------------------	----

35	___ tens and ___ ones	5 tens and 7 ones	<input type="text"/>
----	-----------------------	-------------------	----------------------

42	___ tens and ___ ones	4 tens and 8 ones	<input type="text"/>
----	-----------------------	-------------------	----------------------

60	___ tens	5 tens and 3 ones	<input type="text"/>
		4 tens and 2 ones	<input type="text"/>

Pupil's Objectives: (a) To extend through 60 the reading and writing of the numerals; (b) to learn their serial order; (c) to understand the relative sizes of the numbers they represent; and (d) to learn to use in simple put-together stories the word *cent* and the symbol for *cent* (¢).

New Words: *cent, penny*

Teacher's Preparation. Display a class number chart completed through 60, similar to the one at the top of *Book One* page 31.

Pre-book Lesson

1. On your class number chart point to various numerals in turn—for example, 37, 52, 40, etc.—and ask different children to tell you the name of each numeral you have indicated. Also ask different children to point to specified numerals on the chart. Emphasize the numerals 31 to 60, but do not overlook 1 to 30.

2. Ask children to write on the chalkboard specified numerals—45, 54, 27.

3. Cover a numeral on the chart while the children have their eyes closed. Then ask them to open their eyes and tell what numeral you are covering.

4. Write pairs of numerals on the chalkboard: for example, 53, 24; 52, 25; etc. In some instances ask the children to tell you which numeral represents the larger amount; in other instances, which represents the smaller amount. Also write groups of three numerals on the chalkboard (for example, 48, 32, 59)

and ask children to tell which numeral represents the largest amount and which represents the smallest amount.

Book Lesson

Ex. 1. Children should experience no difficulty in comprehending what is to be done—writing the missing numerals in the chart at the top of the page. You may wish to keep the wall number chart before the children for reference.

Ex. 2. The children are familiar with the type of work in Ex. 2. In each example the pupil is to write the missing numerals in the given sequence.

Ex. 3-5. In Ex. 3 the child is to write the numeral immediately after the given one. In Ex. 4, he is to write the numeral just before the given one. In Ex. 5, he writes the numeral that comes between the two given numerals.

Ex. 6. You will want to work with the children. Have enough real 1-cent coins on hand so that each child may have one to observe. Call attention to the fact that the word *cent* appears on the coin. Emphasize that the coin is correctly called 1 *cent*, although in many places it is also called 1 *penny*. Put the ¢ symbol on the chalkboard and explain that it is a sign that means the same as *cent* or *cents*.

Have the children work in groups of four for the following activity: Ask each group to show 1 cent and 3 cents, then to put these cents together and tell how many cents they have in all. Elicit the oral put-together story: 1 *cent* and 3 *cents* are 4 *cents*. Finally, have each pupil complete this same story in the two ways in his own book.

Do the same for 2 cents and 2 cents.

Differentiations and Extensions

1. It may be helpful to provide additional experiences for *slower learners* in connection with Ex. 2-5, and Ex. 6 on *Book One* page 31. Supplementary work sheets with material similar to Ex. 2-5 can be made easily, of course. Work sheets containing put-together stories about *cents* as in Ex. 6 can be provided also. However, give children an opportunity to use real or "play" coins when working such exercises.

2. Have *more capable children* make up "money problems" for put-together money situations; for example, "I spent 1 cent for a lollipop and 3 cents for another kind of candy. How much did I spend?" When a pupil tells his story, ask if anyone can tell the answer without using pencil and paper. Then have all *pupils* write the story in the two ways shown in Ex. 6.

3. Have all *pupils* engage in appropriate games (see *Teachers' Edition* pages 15-25). Selections may be made from the following: *Connecto*; *Cross the River* (4), (7); *Old Hat* (6), (7); *Over Orange* (6); *The Wizard* (4), (5), (6).

NOTES

31
Reading and Writing to 60

1.

1	2	3		5	6	7	8		10
11		13	14	15		17	18	19	20
21	22	23		25		27	28	29	
31	32			35		37	38		40
	42	43			46	47		49	50
51	52	53		55	56			59	60

2.

36	—	38	—	40	46	—	—	49	—
38	—	—	41	—	53	—	—	—	—

3.

39	40
52	—
20	—

4.

43	44
—	59
—	50

5.

34	35	36
—	—	50
28	—	30

6.

1 penny = 1 cent

1 penny = 1¢

1 cent + 3 cents = — cents

1¢ + 3¢ = —¢

2 cents + 2 cents = — cents

2¢ + 2¢ = —¢



Pupil's Objectives: (a) To compare the sizes of groups and of objects in the picture as a means of getting acquainted with the page; and (b) to develop the ability to use familiar subtraction facts in problem situations.

New Words: *bubbles, glasses*

Book Lesson. The work of this page is the counterpart of that on *Book One* page 26 which involved familiar addition facts in problem situations. Thus, the nature of the activities will be reasonably familiar to the children.

First talk with the children about the things they see in the picture at the top of the page. Ask specific quantitative questions, such as:

How many children are there? How many bubbles are there? Are there fewer bubbles than children?

Put your finger on the littlest bubble to show which one it is.

Put your finger on the highest bubble to show which one it is.

The problems below are to be read to the children, one at a time. The first two problems may be solved by looking at the picture. The remaining problems have a similar setting but their solutions are not to be found in the picture. Helping dot pictures are shown for the first two problems. The children are to make similar "helping pictures" for the other problems.

For Ex. 1-4, just read each problem and have the pupils complete the take-away story.

Ex. 1. The children have blown 5 bubbles. When 2 of the bubbles burst, how many bubbles will be left?

Ex. 2. There are 3 glasses of magic bubble water in the room. The 2 boys are going to take their glasses of bubble water outdoors. Then how many glasses of magic bubble water will be in the room?

Ex. 3. Sue made 4 bubbles and the wind blew away 2 of them. How many of Sue's bubbles were left?

Ex. 4. One day Jack and his friends used 5 glasses for magic bubble water. When they were through playing, they washed and put away 3 of the glasses. How many of the glasses were left to be washed?

If you don't want your pupils to try Ex. 5 and 6 with minuends of 6, substitute 5's for the 6's. (See the paragraphs before Ex. 5-6 on *Teaching Book One* Page 26.)

***Ex. 5.** Tom blew 6 bubbles. Then 2 of them broke. How many of Tom's bubbles were left?

***Ex. 6.** Ellen fixed 6 glasses of magic bubble water. She gave 3 of the glasses to her sisters. How many glasses of the bubble water did Ellen have left?

Differentiations and Extensions

1. For *slower learners* who may encounter difficulty in solving certain of the problems, try this: Have them set up the conditions of a problem with representative materials as the problem is read orally and manipulate the materials in accord with the problem statement. Then have them make representative drawings on the basis of their work at the manipulative level.

2. Have *all pupils* make up take-away problems about other things in or related to the picture. Children may take turns giving one or more of their problems orally to the group. Those in the group may make a representative drawing of the problem and write the take-away story, using the form: $___ - ___ = ___$.

3. Use oral problems with your *more capable children*, encouraging them to write the take-away story without first showing the representative drawing.

NOTES

32

Finding How Many Are Left



1.		___ bubbles - ___ bubbles = ___ bubbles
2.		___ glasses - ___ glasses = ___ glasses
3.		___ bubbles - ___ bubbles = ___ bubbles
4.		___ glasses - ___ glasses = ___ glasses
5.		___ bubbles - ___ bubbles = ___ bubbles
6.		___ glasses - ___ glasses = ___ glasses

Pupil's Objective. To study familiar subtraction stories and facts in related pairs.

New Words: cover, of

Background. Earlier, on *Book One* page 27, children began their study of pairs of addition facts based on the knowledge that a total is not affected by interchanging its parts. Now the children apply this knowledge to the study of pairs of subtraction facts. In general, pupils should eventually realize this fundamental idea: If a total and two parts that compose it are known, you know that you can take away either part and have the other part left. This is the relating idea that leads into pairs of subtraction facts.

Pre-book Lesson

1. Place 5 pieces of chalk on a desk. First ask, **How many are there in all?** (5) Then say: **I'm going to cover 2 of the pieces** (doing so with your hand). **How many are left?** (3) Then ask, **Who can tell me the take-away story?** Write the take-away story on the board, emphasizing the signs you make for "take away" and "is," as readiness for Ex. 2e and Ex. 2f.

Then say to the children: **This time I'm going to cover 3 of the pieces** (doing so with your hand). **How many are left?** (2) **Who can tell me the take-away story?** Write the story on the board, again emphasizing the signs used for "take away" and "is" and the way they are placed.

Then say: **Who can read the two take-away stories we have just found? We call these a pair of stories.**

2. Repeat with one or two additional concrete dramatizations, as needed.

Book Lesson

Ex. 1. Have the children look at the picture, telling and recording how many pieces of candy there are in all. Then follow through the illustration. First, have each pupil cover 1 candy and finish writing the take-away story. Then have each pupil cover 3 candies and finish the take-away story. Finally, discuss with the pupils the statement about the *pair* of take-away stories at the end of the exercise.

Ex. 2a. Use this exercise for illustrative purposes also. Emphasize the idea of a *pair* of take-away stories.

Ex. 2b-2f. Have the children attempt these exercises more or less independently. For each exercise, you may want pupils to write both minuends before they do any covering. Also caution them that in Ex. 2e and Ex. 2f they must write the complete take-away story each time, including the sign for "take away" and the sign for "is."

Differentiations and Extensions

1. Let *more capable children* use some of the magazine pictures, etc., brought in previously as the basis for deriving other appropriate pairs of take-away stories to be used by the class. Have the children use the technique of covering, just as in the exercises in the pupil's book.

2. If *slower learners* have trouble in the picture stage with pairs of take-away stories, go back with them to the manipulative stage and use groups of children or groups of real and representative objects.

3. Some *slower learners* may encounter difficulty in correlating the written take-away story with their action of covering. If you find that to be the case, have them build the take-away story in written form step by step: First, record the size of the total group; then record the amount covered as this action is completed; and finally, record the amount left.

4. Prepare chalkboard exercises or work-sheet material similar to the following for use with *more capable children*: Draw 5 simple lollipops and put the indicated material below the drawing.

Cover 4. _____

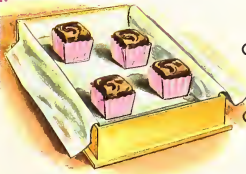
Cover _____. _____

The child is to cover and write the first take-away story. Then, he is to decide and record how many should be covered next to make a pair of take-away stories. He then covers this amount and writes the take-away story.

NOTES

33

Take-Away Stories in Pairs

1.  _____ in all

Cover 1. Write the take-away story.


$$\begin{array}{r} 4 \\ - 1 \\ \hline 3 \end{array}$$

Cover 3. Write the take-away story.

$$\begin{array}{r} 4 \\ - 3 \\ \hline 1 \end{array}$$


$4 - 1 = 3$ and $4 - 3 = 1$ make a pair of stories.

2. Write the pairs of take-away stories.

a.  _____


Cover 1. _____ = _____

Cover 4. _____ = _____

b.  _____


Cover 2. _____ = _____

Cover 1. _____ = _____

c.  _____


Cover 2. _____ = _____

Cover 3. _____ = _____

d.  _____


Cover 3. _____ = _____

Cover 1. _____ = _____

e.  _____

Cover 4. _____

Cover 1. _____

f.  _____

Cover 3. _____

Cover 2. _____



Pupil's Objective. To extend the study of related pairs of familiar subtraction stories and facts.

New Words: *goes, with*

Book Lesson

Ex. 1. Use Ex. 1a as an illustrative example. Then have the children work independently on Ex. 1b through Ex. 1d. In each case the child is to cover one sub-group and write the take-away story, then cover the other sub-group and write the related take-away story to make a pair of take-away stories.

Ex. 2a. Use Ex. 2a as an illustrative example. Guide pupils to see from $4 - 1 = \underline{\quad}$ that they draw a picture of the total—as 4 circles—above the yellow line and cover 1 of them to check the answer before they trace over it. Then help them to see that the 3 in the answer becomes the part to take away in the other story. They then cover 3 circles in their drawing to check the remainder, 1, before they trace over the story.

Ex. 2b. Also use this exercise for illustrative purposes. After pupils draw the total—5 circles—emphasize as they cover the 2 to be taken away that the 3 left will be the number to be taken away in the other story of the pair. Give considerable guidance as they write the $5 - 3$ to begin the second take-away story.

Ex. 2c-2f. Have the children try to do Ex. 2c-2f independently. You will want to supervise the work carefully as several pupils probably will have difficulty with these exercises. However, *all* pupils should try these exercises, because this particular form for working with subtraction pairs is extremely helpful in building thorough understanding. If a few *slower learners* become confused because there are several steps to carry out, you may need to help them start the second fact for each pair. *More capable* children may be able to handle Ex. 2d to 2f without making representative pictures in the space above the yellow line.

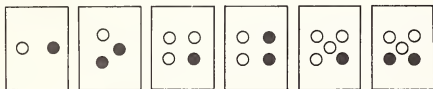
Ex. 3 and 4. Let the children first draw a dot picture and then complete the take-away story in each instance. Have pupils explain orally why we do not have a pair of take-away stories for each of these dot pictures.

Differentiations and Extensions

1. Make a set of 16 cards for playing the game "Pair-O" when it involves subtraction facts. It will be similar to the game involving addition facts described on Teaching Book One Page 28. On each of 10 cards, write one of the following combinations with a blank for the remainder:

$$\begin{array}{lll} 2 - 1 = \underline{\quad} & 3 - 1 = \underline{\quad} & 3 - 2 = \underline{\quad} \\ 4 - 1 = \underline{\quad} & 4 - 2 = \underline{\quad} & 4 - 3 = \underline{\quad} \\ 5 - 1 = \underline{\quad} & 5 - 3 = \underline{\quad} & \\ 5 - 2 = \underline{\quad} & 5 - 4 = \underline{\quad} & \end{array}$$

On each of the other 6 cards, make a representative drawing to show one of the following patterns with its component parts distinguishable:



The game is played in the same manner as when the cards show addition combinations. (See Teaching Book One Page 28.)

2. If *slower learners* need additional help with any of the work on Book One page 34, it probably will be in connection with Ex. 2. Their difficulty would lie in determining the related take-away story. For an example, such as $5 - 2 = \underline{\quad}$, have *slower*

learners draw a dot picture of the total 5 and color or blacken the 2 dots to be taken away. Then first they can cover the 2 dots that are colored and write the story. Next they can cover the uncolored sub-group (3) and write that story. With practice of this type, the *slower learner* should soon get the feeling that when given the total group and its two parts, the taking away of either part leaves the other part.

NOTES

34

More Take-Away Stories in Pairs

1. Write the pairs of take-away stories.

a.



Cover 1. $3 - 1 = \underline{2}$

Cover 2. $3 - 2 = \underline{1}$

b.



Cover 3. $\underline{\quad} - \underline{\quad} = \underline{\quad}$

Cover 2. $\underline{\quad} - \underline{\quad} = \underline{\quad}$

c.



Cover 1. $\underline{\quad}$

Cover 4. $\underline{\quad}$

d.



Cover 3. $\underline{\quad}$

Cover 1. $\underline{\quad}$

2. Write the pairs of take-away stories.

a.

$4 - 1 = \underline{3}$
 $4 - 3 = \underline{1}$

b.

$5 - 2 = \underline{\quad}$

c.

$5 - 4 = \underline{\quad}$

d.

$3 - 2 = \underline{\quad}$

e.

$5 - 3 = \underline{\quad}$

f.

$5 - 1 = \underline{\quad}$

3. No story goes with $2 - 1$.

$2 - 1 = \underline{\quad}$

4. No story goes with $4 - 2$.

$4 - 2 = \underline{\quad}$

Pupil's Objectives: (a) To compare the relative sizes of groups and of objects in the picture as a means of getting acquainted with the page; (b) to review the use of familiar subtraction facts in problem situations; (c) to review pairs of subtraction facts derived from representative drawings; and (d) to introduce gradually subtraction facts stated in abstract form.

New Word: *Eskimos*

Background. This material parallels the work for addition done on *Book One* page 29 and should be treated similarly.

Book Lesson

Include in the discussion of the picture at the top of the page specific quantitative questions such as:

How many Eskimo people do you see? Are there as many igloos as there are Eskimos?

Which is taller—a snowshoe or the igloo?

Are there more dogs than Eskimo children?

The six problems below are to be read to the children. The answers for the first two problems can be found from the picture at the top of the page. The remaining problems have a similar setting but their solution cannot be found in the picture. As each problem is read, the child is to find the answer and write the appropriate take-away story. Note that the recording of the subtraction story is made progressively more abstract with the pupils finally making the record in its entirety in Ex. 5 and 6.

35

Do You Know These Take-Away Stories?



1. — Eskimos — Eskimos = — Eskimos

2. — dogs — dogs = — dogs

3. — — = — 4. — — = —

5.	6.
7.	8.
Cover 2. —	Cover 3. —
Cover 3. —	Cover 1. —

$5 - 2 = 2$ (3)	$4 - 1 = 3$ 5	$3 - 2 = 2$ 1
$4 - 3 = 1$ 2	$2 - 1 = 3$ 1	$5 - 4 = 1$ 2
$5 - 1 = 4$ 3	$4 - 2 = 2$ 1	$5 - 3 = 2$ 3
$3 - 1 = 1$ 2	$5 - 2 = 3$ 2	$3 - 2 = 1$ 4

Ex. 1. There are 5 Eskimos. Two of them are leaving with the sled. How many Eskimos will be left?

Ex. 2. There are 4 dogs in the picture. Two of the dogs are leaving with the sled. How many dogs will be left?

Ex. 3. There are 4 sleds in all in the Eskimo village. One of them is going away. Then how many sleds will be left in the village?

Ex. 4. There are 3 igloos in a group. One of them will be taken down. How many igloos will be left standing?

If you don't want your pupils to try Ex. 5 and 6 with minuends of 6, substitute 5's for the 6's. (See the paragraphs before Ex. 5-6 on Teaching *Book One* Page 26.)

*Ex. 5. There were 6 snowshoes standing outside one igloo. The boys took 4 of the snowshoes to wear. How many snowshoes were left standing outside the igloo?

*Ex. 6. There were 6 Eskimo children playing outdoors. Then 3 children went into an igloo. How many Eskimo children were left outdoors?

Ex. 7-8. These exercises should be familiar to the children. In each instance the pupil is to write a related pair of subtraction facts using the representative drawing. Permit independent work on these examples.

Below the boxes. In each part of this exercise the pupil is to use the same multiple-choice technique as was introduced on *Book One* page 29. He is to draw a ring around the correct numeral of the two given to show the remainder. This exercise represents the first experience in *Book One* which the child has had with subtraction facts in purely abstract form. Use the first two examples in the first column for illustrative purposes. Then have pupils work independently. Circulate among the children and observe them carefully, giving help where necessary.

Differentiations and Extensions

1. If *slower learners* experience difficulty with the purely abstract form of the subtraction facts, provide practice with more examples of the type at the foot of *Book One* page 35, suggesting the use of helping dot pictures.

2. *Slower learners* will not be disturbed by incorrect statements of fact and so will profit from working with the type of activity suggested on Teaching *Book One* Page 29, in connection with the addition facts. For this practice, prepare a set of subtraction examples similar to the illustrations below, in which some answers are correct and some are wrong:

$5 - 2 = 3$ (3) $4 - 2 = 2$ (2) $3 - 1 = 2$ $5 - 4 = 3$

If the statement of fact as shown is correct, as in the first example, the child is to draw a ring around the answer. If the statement is not true to fact, as in the second example, he is to put an X on the wrong answer and then write the correct one.

3. Have *more capable children* make up other take-away problems (with minuends not exceeding 5) from the picture at the top of the page to give orally to *slower learners* for practice in saying the appropriate take-away stories.

4. Have all pupils engage in appropriate number games (see *Teachers' Edition* pages 15-25). Selections may be made from the following: *Climb the Ladder* (5); *Fish* (5); *Over Orange* (4); *The Wizard* (9).

Pupil's Objective. To review and extend the recognition of common measuring instruments and their most important uses.

New Words: *match, things*

Background. The work on this page is restricted to recognition of common measuring instruments for determining length, weight, capacity, temperature, and speed, and the common uses for these instruments. No stress is placed upon the act of measurement. Similarly, attention to units of measure is not a primary concern at this time; however, a feeling for units of measure eventuates as pupils evaluate the uses of the instruments.

Pre-book Lesson. If possible, have the following measuring instruments available: a foot rule, a yardstick, a tape measure (25 feet or more), a measuring cup, a bushel basket, an outdoor thermometer, kitchen scales, and a speedometer.

1. First deal with the instruments used to measure length—distance, height, width, etc. Show each of these instruments you have at hand: the foot rule, the yardstick, the tape measure. Ask the children to give the name of each of these instruments. Supply the name if not known. Ask pupils to tell things for which each of the instruments is used and help the children to sense when it is more appropriate to use one instrument than another.

2. Treat the other measuring instruments in a similar manner. Some care must be exercised when dealing with the thermometer and the speedometer. Children at this age cannot be expected to comprehend the full significance of a degree of temperature or of a mile an hour of speed. In instances such as these, it will be necessary to "play down" the full significance of the unit, although some mention of the units cannot be overlooked. For example, auto speed limits are familiar to children, as are temperatures within certain ranges.

Book Lesson

Ex. 1. First, have the children identify each instrument pictured in the middle column. Then, have them identify the essential characteristic of the first situation (the boy taking off his coat). This suggests the thermometer for measuring the temperature. Have the children draw a line from that boy to the thermometer. In a similar manner, deal with the butcher and the woman who is cooking, discussing with the pupils the essential characteristic in each situation, that is, what measuring instrument might be used in the situation. After this, let the pupils finish Ex. 1 independently, but under your supervision. Give credit if pupils connect the skates and the thermometer. However, if any pupils are alert enough to question this because they recognize that the thermometer reads 80°, compliment them for this observation.

Ex. 2. First have the children identify each measuring instrument and possibly the essential characteristic of each pictured situation. Then have the children work independently on the exercise in the same manner as for Ex. 1.

In connection with Ex. 1 and 2, be mindful of the fact that at times a pupil may give logical reasons for pairing a given situation with a different measuring instrument from the one you would choose. Thus, in checking a child's work, if he has not responded in the way you anticipated, talk with him about why he made his response. It may be that his response is essentially correct, although somewhat unconventional.

Differentiations and Extensions

1. If *slower learners* have difficulty with some of the exercises, it may be due to the fact that they are not attending to the crucial

element in a pictured situation. For example, in the picture of the man picking tomatoes, these children may focus their major attention upon the man rather than upon the tomatoes. You will need to discuss such situations with these children and help them to sense the phase of the pictured situation that is crucial in relation to one or another of the measuring instruments shown.

2. Have *all children* collect pictures and make scrapbooks or posters involving measuring instruments and their uses. This activity could be developed from either of two points of view:

a. Paste a picture of a measuring instrument in the center of the page or poster. Then paste other pictures around this central one which show situations in which the measuring instrument would be used appropriately.

b. Paste a picture of a social situation in the center of the page or poster. Then paste other pictures around this central one—pictures of different measuring instruments that could be used appropriately in relation to the central social situation.

3. *More capable children* may extend the discussion of measuring instruments and their uses to include additional instruments, less common or more specialized uses of measuring instruments, and some mention of units of measure associated with various measuring instruments.

Reminder. Remember to maintain the children's ability to identify single objects cut into halves and to identify each of the two equal parts as one half.

36

1. Match the things.



Measuring



2. Match the things.



Pupil's Objectives: (a) To recognize time on the hour associated with significant events of the day; (b) to show a given hour on the clockface; and (c) to learn to recognize the words *eleven* and *twelve*, and associate each with its related numeral.

New Words: *eleven, twelve*

Pre-book Lesson. Using a clock with movable hands, provide the following kinds of experiences:

a. Have the children identify the hour hand and the minute hand—the short hand and the long hand—and indicate the significance and relative motion of each. Have children in their own words tell you that the long hand moves faster than the short one; that after the long hand makes one complete revolution, the short hand has moved only to the next numeral and one hour of time has elapsed. An actual clock will be most helpful in showing this relationship.

b. Set the clock hands to show various hours and ask the children to tell the time. Also have the children indicate some of the significant happenings of the day for the time when: they get up; they eat their meals; they watch certain TV programs; they go to bed; etc.

c. Specify certain hours and have pupils set the hands of the clock to show these times. As above, tie in actual events and happenings of the day with as many of the hours as possible.

Book Lesson

Ex. 7. Have the children look at the first picture, identifying the fact that the boy is just getting up in the morning and that he

is brushing his teeth. Have the children look at the three clocks in the same box and see that two of them are crossed out and that the one remaining shows the most likely time of day for the pictured event. Have the children actually trace over the dashed lines to cross out the two clocks not pertinent to the event.

Ex. 2-4. Have the children identify the situation in each case. Then, as in Ex. 1, have pupils independently cross out the two clocks which do not show the correct time for the event.

Ex. 5. For the first two clocks have the children write the numeral before the word *o'clock* to tell what time it is. On the other two clocks have the children draw, in the first one, only the hour hand (short hand) and, in the second, both hands so that the clocks will show the indicated times.

Ex. 6. Have the children identify, if possible, the words *eleven* and *twelve* in the little yellow box. If necessary, read the words aloud and connect them definitely with the related numerals. In the exercise to the right, have the children match each numeral with its related number word by drawing connecting lines. This exercise includes the new words *eleven* and *twelve*.

Differentiations and Extensions

1. Work sheets with additional exercises similar to those in Ex. 5 on *Book One* page 37 may be provided for children who need further practice. The two kinds of activities may appear on the same work sheet or you may wish to devote one work sheet to telling time and another to showing time.

2. Have the children make their own clocks. Use paper plates for the clockfaces. Hands may be cut from heavy construction paper. A brass paper fastener may be used to attach the hands to the clockface. The children may wish to decorate the clockfaces, as well as number them.

3. Have children work in pairs with the completed clockfaces, telling and showing various hourly times.

Reminders

1. Extend the work with ordinals to *sixth* at this time. You may wish among others to use some of the following activities:

a. Have 6 children—each with a different name—form a line at the front of the room. Ask:

Who is fifth in line? Who is first? Who is sixth?

In which place in the line is Sue? In which place is Jack?

b. Use ordered arrangements of other things in the classroom and provide experiences similar to those used previously. Include more than 6 objects upon occasion, but do not use an ordinal word beyond *sixth* at this time except as an inventory item.

c. Call attention to other uses of ordinals; for example, the first, second, third, fourth, fifth, or sixth day of the week or month.

2. Remember to provide experiences dealing with various abilities associated with the numbers to 60, such as:

- a. rote and rational counting
- b. serial order of numerals
- c. reading and writing numerals
- d. tens-and-ones structure of numbers
- e. relative sizes of numbers

Take advantage of opportunities that arise in connection with in-school and out-of-school activities in which the children engage.

3. Remember also to provide appropriate rote and rational counting experiences in counting by 2's to 20.

37

Telling Time

1.

2.

3.

4.

5.

— o'clock — o'clock 3 o'clock 10 o'clock

6.

eleven	11	9	twelve	eight	3
twelve	12	10	nine	eleven	12
		11	eleven	three	11
		12	ten	twelve	8

eleven 11

twelve 12

Pupil's Objectives: (a) To compare the relative sizes of groups and of objects in the picture as a means of getting acquainted with the page; (b) to learn to distinguish between the use of addition and of subtraction in problem situations; and (c) to practice the recall of answers for addition and subtraction combinations.

New Words: *bears, dolls*

Background. Thus far the children have worked with both put-together stories and take-away stories in relation to pictured situations but in an isolated setup. Here, for the first time, children deal with both kinds.

By this time, the children have had very extensive experiences with the addition and the subtraction facts through 5. It is important that they now be asked to try to recall the answers for combinations stated in abstract form.

Pre-book Lesson. First, put the following on the chalkboard:

children + children = children

children - children = children

1. Have 5 children come to the front of the room. Seat 3 of them at a table. Have the other 2 standing at a slight distance. Read the following problem: **Three children were sitting at the arithmetic table. Two other children came to join them. How many children were sitting at the arithmetic table then?** Do not have the children dramatize this. Draw in the box beside the first problem on the chalkboard a helping dot picture, showing separate groups of 3 and 2. Emphasize why we know this is a put-together story and we must *think* the two groups together. Write in the blanks of the problem on the chalkboard the correct numerals to complete the put-together story.

2. Now have all five children seated in a circle. Read the following problem: **Five children were reading together. One of them went back to his desk. How many children were reading together then?** Again, do not have the pupils actually go through the action. However, do draw a helping dot picture in the box for the second problem on the chalkboard. Show 5 dots and cross out 1. Emphasize why we know this is a take-away story and not a put-together story. Supply the missing numerals to complete the second story on the chalkboard.

Book Lesson

First, discuss the picture with the children, identifying the various things shown. Include in this discussion specific quantitative questions about toys on the highest shelf, toys with the longest legs, the biggest toy, and so on.

Read the following problems to the children one by one. In each case the child is to determine whether the problem is a put-together problem or a take-away one. In the box he is to draw a helping dot picture if needed, and then write the story by supplying the missing numerals. Because of the added difficulty of choice of process in these five problems, all of them are directly associated with the picture and none require transfer to sums or minuends larger than 5.

Ex. 1. There are 2 dolls on the shelf. There are 3 other dolls. How many dolls are there in all?

Ex. 2. There are 5 dolls in all. Carol will take 2 of them to walk. How many dolls will be left?

Ex. 3. Two bears are sitting on chairs. Two other bears are sitting on the shelves. How many bears are there in all?

Ex. 4. Yesterday there were 5 bears on the shelves. Three of the bears were taken down from the shelves. How many bears are left on the shelves now?

Ex. 5. There are 4 hats on dolls. Sue will put away 2 of the hats. How many hats on dolls will you see then?

Foot of the page. In these exercises, have the children work independently, writing each answer. Emphasize that in the first two rows all are put-together stories; that in the last two rows all are take-away stories. Permit dot pictures only when absolutely necessary.

Differentiations and Extensions

1. Some *slower learners* may need additional problem-solving with addition and subtraction experiences mixed. If so, cut out appropriate pictures from a magazine and prepare suitable problems, as on *Book One* page 38.

2. For *slower learners* who may need further practice in the recall of addition and subtraction facts stated in abstract form, have *more capable children* prepare individual sets of fact cards with sums and minuends through 5. The children can write an addition (or subtraction) combination on the front of each card and the complete statement of fact on the back. *Slower learners* and *more capable children* can work in pairs or the cards can be used for individual practice.*

*For those who wish them, sets of *Number Cards* may be purchased from the publisher, Ginn and Company. Some of these cards permit further practice on the facts from representative pictures. (See *Teachers' Edition*, page 9.)

38

Put-Together and Take-Away Stories



- dolls + dolls = dolls
- dolls - dolls = dolls
- bears + bears = bears
- bears - bears = bears
- hats - hats = hats

$2 + 2 = \quad 1 + 2 = \quad 4 + 1 = \quad 3 + 2 = \quad$

$1 + 4 = \quad 2 + 3 = \quad 2 + 1 = \quad 1 + 3 = \quad$

$5 - 1 = \quad 4 - 3 = \quad 5 - 3 = \quad 3 - 2 = \quad$

$2 - 1 = \quad 5 - 4 = \quad 4 - 1 = \quad 5 - 2 = \quad$



Pupil's Objective. To maintain important number abilities developed previously.

Book Lesson. These exercises all involve familiar activities. At the outset remind the children about the nature of each activity and then permit them to proceed independently throughout the page.

Ex. 1-2. Children are to write a pair of related addition facts for each representative picture.

Ex. 3-4. Children are to write a pair of related subtraction facts using each representative picture.

Ex. 5. Children are to write the missing numerals in each of the six series, counting by 1's.

Ex. 6. In the left-hand column, children are to circle the numeral representing the largest amount in each group and, in the right-hand column, the numeral representing the smallest amount in each group.

Ex. 7-8. Children are to write the missing numerals in each series, counting by 2's.

Differentiations and Extensions. The children's completed work can serve as a basis for determining areas of individual difficulty or weakness. When weaknesses are identified, appropriate reteaching followed by practice should be provided. It is important to have the reteaching precede further practice because, if practice alone is applied, pupils who have erroneous ideas will only get further practice to fix these errors.

LOOKING AHEAD

In order to provide Looking-Ahead activities with some geometric forms (the circle and the square), have available several objects with one circular surface or more; for example, a tin can, a milk bottle, a round table, and so on. Also, have available several objects with at least one side in the shape of a square; for example, a block or a chalk box.

1. Have the children look at the top of the tin can. Have one child trace the circular shape with his finger. Ask the children what we call something that is round like the top edge of the tin can. If no child responds correctly, tell the class that it is called a *circle*. (Be certain the children realize that the top or bottom *edge* of the can, not the can itself, is a circle.) Have the children identify circles on other objects you have at hand and circles they may see in the classroom.



Draw an oval on the chalkboard or refer to an object that is oval in shape. Help the children to sense that the edge of the oval is *not* a circle. Leave it to the children to explain in their own words why this is so.



2. Proceed as above for objects with one side in the shape of a *square*. Also, differentiate an oblong (rectangle) from a square. Have the children understand that oblongs and squares are different in some ways.

NOTES

39

Many Things

1.  $__ + __ = __$ $__ + __ = __$	2.  $__ + __ = __$ $__ + __ = __$
---	---

3.  $__ - __ = __$ Cover 2. $__ - __ = __$	4.  $__ - __ = __$ Cover 4. $__ - __ = __$
---	---

5. 50 51 $__$ $__$ $__$	53 $__$ 55 $__$ $__$
46 47 $__$ $__$ $__$	32 $__$ 34 $__$ $__$
28 29 $__$ $__$ $__$	17 $__$ 19 $__$ $__$

6. 14 39 26 51	40 15 23 39
47 60 9 32	57 48 31 52
54 25 45 10	36 20 44 47
33 11 7 28	5 42 50 30

7. Count by 2's.	8. Count by 2's.
2 4 $__$ $__$ $__$	12 $__$ $__$ $__$ $__$
6 $__$ $__$ $__$ $__$	4 $__$ $__$ $__$ $__$
10 $__$ $__$ $__$ $__$	8 $__$ $__$ $__$ $__$



Pupil's Objective. To approach 3-addend addition gradually by using addition facts progressively in combining the three groups to find the total.

New Words: *cats, hens*

Background. When pupils are asked to combine three groups of real objects to find how many there are in all, it is not uncommon for them to put all the groups together and count. This procedure will give a correct answer but will not develop the pattern of thinking and performance necessary for the addition of three or more addends. Consequently, when working with manipulative materials and pictured situations, the children should combine in a manner consistent with the desired pattern of thinking. The learning experiences provided on *Book One* page 40 have been developed with this thought in mind.

Pre-book Lesson

1. Place 5 books on the table, arranged in piles of 2, 1, and 2. Pose the question of finding how many books there are in all. Translate this into symbolic form by writing on the chalkboard

$$2 \text{ books} + 1 \text{ book} + 2 \text{ books} = \underline{\hspace{2cm}} \text{ books}$$

Solicit suggestions for finding the total. If some children proceed to count, accept their method and answers, *but do not stop with that*. Evoke or suggest the idea that first we might put the 2 books and the 1 book together and think how many that would be. Then we can put the other 2 books with these and find how many in all. Follow through this suggestion with appropriate manipulation and symbolic recording. As each step is worked out with materials, first record on the chalkboard: *2 books and 1 book are 3 books*. Then, beneath that, show *3 books and 2 books are 5 books*. Then, return to the original symbolic statement and complete it so that it finally reads

$$2 \text{ books} + 1 \text{ book} + 2 \text{ books} = \underline{5} \text{ books}$$

2. Follow a similar procedure using other combinations for 3 groups having a sum of 4 or of 5. The following combinations may be used:

2, 1, 1	1, 1, 2	2, 2, 1	1, 2, 2
1, 2, 1	3, 1, 1	1, 3, 1	1, 1, 3

Book Lesson

Ex. 1. Have the children identify and record the number of hens in each of the three groups (2, 2, and 1). Then have the children observe in the second row that in the two left-hand groups, two hens are joining the other two. Have the pupils tell and record the story: *2 hens and 2 hens are 4 hens*. Also, have pupils observe and record that 1 hen remains separate from the others that have been combined. Have the children then observe that in the third row the 1 hen is joining the other four. Pupils should tell and record the story: *4 hens and 1 hen are 5 hens*. Then have them record below the box the complete story about the hens: *2 hens + 2 hens + 1 hen = 5 hens*. They should then read orally: "2 hens and 2 hens and 1 hen are 5 hens."

Ex. 2. Follow a similar procedure with the cats. In this instance, note that the final story below the box is to be written in two forms: *2 cats + 1 cat + 2 cats = 5 cats*; then *2 + 1 + 2 = 5*. These, of course, will be read: "2 cats and 1 cat and 2 cats are 5 cats"; "2 and 1 and 2 are 5."

Differentiations and Extensions. Have boys and girls compete in dramatizing stories about putting three groups together.

1. Write the following on the chalkboard or on work sheets given to the girls:

____ boy ____ boys ____ boys
 ____ boy and ____ boys are ____ boys. ____ boys
 ____ boys and ____ boys are ____ boys.
 ____ boy and ____ boys and ____ boys are ____ boys.
 ____ + ____ + ____ = ____

Then have the *boys* act out the put-together story about 1, 2, and 2. First, have the 5 boys arrange themselves as 1, 2, and 2. Then have one group of 2 boys join the 1 boy, with the other 2 boys remaining at one side. Finally, have the remaining 2 boys combine with the 3. As the boys are acting out this story, have the girls record the story in symbols on the chalkboard or on their work sheets.

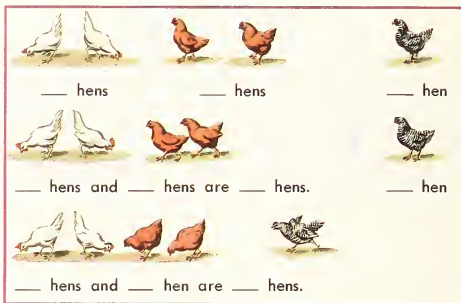
2. Repeat the first activity but have the girls act out a story and the boys record it. See which group scores better in recording the dramatized regrouping.

3. If *slower learners* seem unable to do three-addend addition without representative pictures, have *more capable children* make cards with groups that total no more than 5. This is good experience for the *more capable children* because the figuring out of a variety of three-addend situations with totals of no more than 5 requires careful thinking.

40

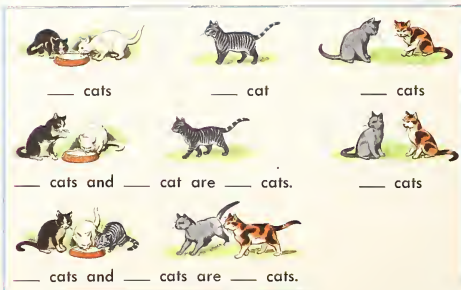
Putting Three Groups Together

1.



$$2 \text{ hens} + 2 \text{ hens} + 1 \text{ hen} = \underline{\hspace{2cm}} \text{ hens}$$

2.



$$\underline{\hspace{2cm}} \text{ cats} + \underline{\hspace{2cm}} \text{ cat} + \underline{\hspace{2cm}} \text{ cats} = \underline{\hspace{2cm}} \text{ cats} \quad \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Pupil's Objective. To develop further the ability to use 3-addend addition.

Background. The dynamics of combining are not explicit in the work of *Book One* page 41. The child must *think* the groups together in each case. It is especially important to see that the child uses the correct thinking pattern—that of first adding two of the three numbers, and then adding the third number to the sum of the first two.

Pre-book Lesson

1. Arrange 5 children at the front of the room in sub-groups, from left to right, of 1, 2, and 2. Do not have the pupils actually move together but have the other children tell and record the *story* about putting these groups together. First, have the class *think* the 1 and 2 together, then write on the chalkboard: $1 + 2 = 3$. Next, have the class *think* the other 2 joined with the 3, then write on the chalkboard: $3 + 2 = 5$. Finally, write on the chalkboard: $1 + 2 + 2 = 5$.

2. Repeat with 1, 3, and 1.

3. Draw 5 "blocks" on the chalkboard, arranged 2, 1, and 2. Work through the oral thinking pattern associated with combining.

4. Repeat using an arrangement of 3, 1, and 1 blocks.

Book Lesson

Ex. 1-2. Have the children work Ex. 1 under your direction. They should experience no difficulty in writing the stories with

the background of the Pre-book Lesson experiences. Then let them try Ex. 2.

Ex. 3-4. Have the children write the indicated story in each case while you check carefully what they are doing. Then have the children tell *orally* what they really *thought* to find the sum. For example: In Ex. 3, the *written* story would be simply: $1 + 3 + 1 = 5$. The *oral* thinking pattern should be, in effect, "1 and 3 are 4; 4 and 1 are 5."

Ex. 5-8. The children first are to draw a dot picture as a helper and then write the answer for the example. Use your own judgment as to whether the dot picture should be required of every child for all four examples or whether you wish the dot picture to be omitted in Ex. 7 and 8. To assure some experience in reproducing the number situation, all children should draw the dot pictures in at least Ex. 5 and 6. In any event, be certain to have the children tell their oral thinking patterns for Ex. 5-8.

Ex. 9-12. The children should supply the sums here without the aid of any dot pictures. Allow the use of dot pictures only when it is absolutely necessary. Again, check the oral thinking patterns used to find the answers.

Differentiations and Extensions

1. If *slower learners* show a tendency to count all groups together and do not follow the desired pattern of thinking, prepare work sheets with representations similar to those in Ex. 3 on *Book One* page 41 but with symbolic records of the form used in Ex. 1 and 2.

2. An interesting type of experience can be provided for *all pupils* in the following way: Give each child a set of two facts that could be combined into a single 3-addend example. Have him complete each fact and write the 3-addend statement.

$$\begin{array}{r} 2 + 1 = \underline{\quad} \\ \underline{\quad} + 2 = \underline{\quad} \\ \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$$

3. Have *more capable children* see which exercises on *Book One* page 41 are the same except for the order in which the groups are combined. For example, Ex. 3 and Ex. 9 involve the same sub-groups but in a different order. The same is true of Ex. 2, Ex. 4, Ex. 10, and Ex. 12. These serve as illustrations of two important mathematical principles: (1) among 3 addends, any addend may be added to the sum of the two other addends without changing the final sum (association principle); and (2) in an addition example the order of the addends may be changed without changing the sum (commutation principle). While you will not formalize these ideas at this point, you will want to realize that you are providing the basis for principles that are widely used in later mathematics.

NOTES

41

More Put-Together Stories

1.



Finish the work.

$$3 + \underline{\quad} = \underline{\quad}$$

$$4 + \underline{\quad} = \underline{\quad}$$

$$3 + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

2.



Write the work.

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

3.



$$\underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$



$$\underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

5.



$$1 + 1 + 1 = \underline{\quad}$$



$$2 + 1 + 1 = \underline{\quad}$$

7.



$$1 + 2 + 1 = \underline{\quad}$$



$$1 + 1 + 2 = \underline{\quad}$$

$$9. 1 + 1 + 3 = \underline{\quad}$$

$$10. 2 + 2 + 1 = \underline{\quad}$$

$$11. 3 + 1 + 1 = \underline{\quad}$$

$$12. 2 + 1 + 2 = \underline{\quad}$$

Pupil's Objective. To study the parts of 6 in preparation for work with the addition and subtraction facts for 6.

New Words: *books, crayons*

Teacher's Preparation. Have available enough real objects (buttons or other suitable counters) so that each pupil may have 6 of a kind to manipulate.

Pre-book Lesson

1. Have each pupil supplied with 6 buttons (or other suitable items). Have pupils tell you that they have 6 in the whole group. As you draw 5 circles and 1 circle on the board, have each pupil move one button away from the other 5 buttons. Ask the following questions: **How many buttons are there in this part of the group?** (5) **How many in this part of the group?** (1) **What parts of 6 do we see? Tell me in two ways.** (5 and 1; 1 and 5)

As you draw 4 circles and 2 circles below the 5 circles and 1 circle, have pupils move a button so they will have sub-groups of 4 buttons and 2 buttons. Ask questions similar to those above.

Finally, draw 3 circles and 3 circles and have pupils use 3 buttons and 3 buttons. Ask questions similar to those above, but take cognizance of—and emphasize—the fact that we can tell about these parts of 6 in only one way—3 and 3—since both parts are the same size.

2. Repeat item 1 using 6 children at the front of the room and having pupils tell the parts of 6 as you progressively separate the group of 6 into parts of 5 and 1, 4 and 2, and 3 and 3. Each time, have the class find the appropriate circles that you drew earlier on the chalkboard. As they do this, beside the circles draw and fill in two frames ($\frac{\quad}{\quad}$ and $\frac{\quad}{\quad}$), except for 3 and 3 when only one frame is necessary.

Book Lesson

Ex. 1. Have the children look at the picture at the top of the page. Let them identify and record in Ex. 1 the number of children in the whole group, the number with chairs, and the number with no chair. Then in the frames, have them trace over and complete the story about 6 and its parts 5 and 1, written in two ways.

Ex. 2. Have the children identify and record the number of crayons in all, the number of yellow crayons, and the number of red crayons. Then have the pupils finish the "parts" story in two ways in the frames.

Ex. 3. Have the children identify and record the number of books in all, the number of red books, and the number of blue books. Then have them finish the "parts" story in the frame and tell why it is written only one way.

Differentiations and Extensions

1. Have *all pupils* look at the picture at the top of the page again. Let them find in the picture the story about 6 and its parts, 5 and 1. (Five are sitting; 1 is standing.) Let them find the story about 6 and its parts, 4 and 2. (Four of the children are girls; the other 2 are boys.) Also have them find the story about 6 and its parts, 3 and 3. (Three children have books; the other 3 do not.) Have them write the "parts" stories in frames.

2. If some of the *slower learners* have difficulty with finding parts in the picture, have six of your *more capable children* group themselves as in the picture to dramatize the several situations more effectively.

3. Check some of the *more capable children* to see if they are able to tell you all about 6 and its parts without using objects or pictures.

42

Parts of 6



6 children in the whole group

— with chairs

— with no chair

$\frac{6}{5}$ and $\frac{1}{1}$

$\frac{6}{1}$ and $\frac{5}{5}$

2.



— crayons in all

— are yellow crayons.

— are red crayons.

$\frac{6}{4}$ and $\frac{2}{2}$

$\frac{6}{2}$ and $\frac{4}{4}$

3.



— books in all

— are red books.

— are blue books.

$\frac{6}{3}$ and $\frac{3}{3}$

Pupil's Objectives: (a) To obtain further experience in working with the group of 6 and its parts; and (b) to review earlier work with put-together and take-away stories.

Book Lesson

Ex. 1-6. These exercises provide experiences in writing stories about 6 and its parts in connection with pictures of real objects in the first row and of representative items in the second row. Each story is to be written in two ways, except in Ex. 3 and Ex. 5. Children should be asked to explain orally why the "parts" stories in Ex. 3 and Ex. 5 are written in only one way.

Ex. 7. Here children are to work at the abstract level, finishing a "parts" story that has been started and then writing the related story for the same parts (except for 6 and its parts 3 and 3).

Ex. 8. Children are to finish each addition or subtraction story and then the related story that goes with it to make a pair of addition stories or a pair of subtraction stories.

Ex. 9. Children are to finish each addition story by recalling and writing the sum.

Ex. 10. Children are to finish each subtraction story by recalling and writing the remainder.

2. If *slower learners* have difficulty with Ex. 7 or with the prepared work sheet or with Ex. 8-10, let them use buttons or other items as helpers. However, always keep edging pupils away from using objects because pupils will seldom automatize answers if they continue to use objects or pictures.

3. Have the *more capable children* make up examples with pictures of representative items similar to those in Ex. 4-6 on *Book One* page 43, but involving groups of 2, 3, 4, 5, and 6. These can be used with children needing further experience at this level of work.

4. Have the *more capable children* make a chart similar to the pupil's *Book One* page 24, and include the parts for 6.

5. Have *all pupils* engage in appropriate games (see *Teachers' Edition* pages 15-25). Selections may be made from the following: *Climb the Ladder* (3); *Fish* (3); *Guess Again* (4); *The Wizard* (7).

Reminder. Remember to provide oral and manipulative experiences that will maintain the idea of *one more* and *one less*. Use total groups no larger than 10.




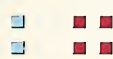
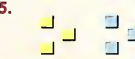

NOTES

Differentiations and Extensions

1. For *all children*, provide further experience such as that in Ex. 7 on *Book One* page 43. Make up and duplicate a work sheet with exercises of this type, using parts of 2, 3, 4, and 5, as well as parts of 6.

43

Parts of 6 Again

<p>1. </p> <p>6 4 and</p> <p>6 2 and</p>	<p>2. </p> <p>6 and</p> <p>6 and</p>	<p>3. </p> <p>and</p>
<p>4. </p> <p>and</p> <p>and</p>	<p>5. </p> <p>and</p> <p>and</p>	<p>6. </p> <p>and</p> <p>and</p>

7. Finish the work.

6 1 and	6 2 and	6 3 and
6 and	6 and	

8. Finish the work to make pairs.

a. $3 + 1 =$ b. $3 + 2 =$ c. $5 - 1 =$ d. $3 - 1 =$

9. Finish the stories. $3 + 2 =$ $3 + 1 =$ $4 + 1 =$

10. Finish the stories. $4 - 1 =$ $5 - 4 =$ $5 - 2 =$



Pupil's Objective. To learn about the pair of put-together stories about $5 + 1$ and $1 + 5$.

Pre-book Lesson. You may want to use toys that are available in your room. Have actual dramatizing of combining 5 and 1 and write the record on the board. Do the same with 1 and 5. Then repeat the experiences, but do not actually move the toys together.

Book Lesson

Ex. 1. Say: Look at the cars in the picture at the top of the page. How many blue cars do you see going up to the bridge? (You may want to find out if any pupils know this as a "ramp.") (5) Now write the numeral that tells how many blue cars there are. How many red cars do you see waiting to go up to the bridge? (1) Write the numeral that tells how many red cars. Now look at the first put-together story about these cars. (Write on the chalkboard: $5 \text{ cars} + 1 \text{ car} = \underline{\hspace{1cm}} \text{ cars}$) How many cars are there all together? (6) Write the numeral to finish the story. Now look at the story written a short way. (Write on the chalkboard: $5 + 1 = \underline{\hspace{1cm}}$) Write the answer.

Then say: Look at the second put-together story about the cars. (Write on the chalkboard: $1 \text{ car} + 5 \text{ cars} = \underline{\hspace{1cm}} \text{ cars}$) Write the numeral to finish the story. Now finish the story that is written the short way. Do the two short stories have the same answers? Are we putting the same groups together in each story? How are the two stories different? Since we have two stories, we can call them a pair of stories: 5 and 1 are 6 and 1 and 5 are 6 make a pair of stories.

Ex. 2. Follow substantially the same procedure as above. After the stories have been written, be certain to emphasize that $1 + 5 = 6$ and $5 + 1 = 6$ are a pair of stories.

Ex. 3. First have the children identify and record the number of tires in the picture. Then have the children draw 1 more tire. A simple ring-within-a-ring will suffice for this. Next ask the children to tell two put-together stories about 5 tires and 1 tire. Then have the children write each of the two stories by filling in the blanks. Finally, emphasize that these two are a pair of stories.

Ex. 4. Follow substantially the same procedure as for Ex. 3.

Differentiations and Extensions

1. Add cards with the representative drawing of the component parts, 5 and 1, as well as for the combinations $5 + 1 = \underline{\hspace{1cm}}$ and $1 + 5 = \underline{\hspace{1cm}}$ to the "Pair-O" deck of cards suggested for a game on Teaching Book One Page 28. Then have all pupils play the game with these new cards included.

2. If slower learners do not seem to grasp the essential difference between the two stories in the pair, revert to a manipulative form of experience. Show 5 objects in a group and 1 more. Ask the children to put the 1 with the 5 and find how many there are in all, telling and writing the appropriate story. Then go back to the 5 and 1 grouping and have the children put the 5 with the 1, telling and writing the appropriate story this time. Help the children in this way to sense the important idea of commutation: that the order in which we combine the groups does not affect the sum.

Put-Together Stories about $5 + 1$ and $1 + 5$

1.



— blue cars. — red car. Finish the put-together stories.

$$5 \text{ cars} + 1 \text{ car} = \underline{\hspace{1cm}} \text{ cars} \quad 5 + 1 = \underline{\hspace{1cm}}$$

$$1 \text{ car} + 5 \text{ cars} = \underline{\hspace{1cm}} \text{ cars} \quad 1 + 5 = \underline{\hspace{1cm}}$$

$5 + 1 = 6$ and $1 + 5 = 6$ make a pair of stories.

2.

— big truck

— little trucks



Finish the put-together stories.

$$1 \text{ truck} + \underline{\hspace{1cm}} \text{ trucks} = \underline{\hspace{1cm}} \text{ trucks} \quad \underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$5 \text{ trucks} + \underline{\hspace{1cm}} \text{ truck} = \underline{\hspace{1cm}} \text{ trucks} \quad \underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

3. How many are here? — Draw 1.



Write the put-together stories.

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

4. How many are here? — Draw 5.



Write the put-together stories.

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

Pupil's Objective. To learn about the pair of put-together stories about $4 + 2$ and $2 + 4$.

New Words: boys, girls

Background. As one nudges the pupils toward mastery of new facts, there is real value in not interrupting this learning by requiring pupils constantly to learn new procedures. In this program, the plan is followed of using essentially the same thorough procedures for the work with each pair of facts. The pupils thereby know exactly how to go ahead with the work on each page and yet each new page is of interest to him because of the wide variation of interesting social situations. Further, this plan provides for a maximum of independent work on the part of the pupils and thus makes it possible for you to spend more time watching individuals work and helping them when necessary. The Book Lessons will continue to suggest the several steps in the work on a page, but your pupils may reach the point where the guided discussion can be kept to a minimum.

Book Lesson

Ex. 1-2. The procedure is identical with that followed on the previous page (*Book One* page 44). In *Ex. 1* and *Ex. 2*, first have the children identify and record the number in each group. Then have them finish the put-together stories in the appropriate ways. Emphasize the ways in which the two stories are alike and different. Finally, call attention to the fact that the two stories make a pair.

Ex. 3-4. First, have the children identify and record the number of objects in the given group. Then have them draw the indicated number of items, making the hats quite simple in each case. As before, each of the two stories is written in symbolic form and the idea of a pair of stories is emphasized.

Differentiations and Extensions

1. Add cards for the representative drawing of the component parts 4 and 2, as well as for the combinations $4 + 2 = \underline{\hspace{1cm}}$ and $2 + 4 = \underline{\hspace{1cm}}$ to the "Pair-O" deck of cards suggested on *Teaching Book One* Page 28. Then have the children play the game with these new cards included.

2. If *slower learners* have any difficulty grasping the essential difference between the two stories in the pair, revert to manipulative experiences with groups of 4 and 2, combining first one way and then the other. Help these pupils to sense that the order in which we combine groups does not affect the sum (the law of commutation).

NOTES

45

Put-Together Stories about $4 + 2$ and $2 + 4$



big boys. little boys. Finish the put-together stories.

$$4 \text{ boys} + 2 \text{ boys} = \underline{\hspace{1cm}} \text{ boys} \quad 4 + 2 = \underline{\hspace{1cm}}$$

$$2 \text{ boys} + 4 \text{ boys} = \underline{\hspace{1cm}} \text{ boys} \quad 2 + 4 = \underline{\hspace{1cm}}$$

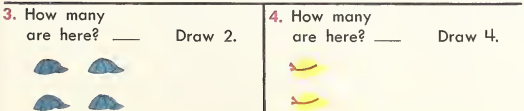
$4 + 2 = 6$ and $2 + 4 = 6$ make a pair of stories.



big girls. little girls. Finish the put-together stories.

$$2 \text{ girls} + \underline{\hspace{1cm}} \text{ girls} = \underline{\hspace{1cm}} \text{ girls} \quad \underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

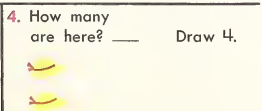
$$4 \text{ girls} + \underline{\hspace{1cm}} \text{ girls} = \underline{\hspace{1cm}} \text{ girls} \quad \underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$



Write the put-together stories.

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$



Write the put-together stories.

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

Pupil's Objectives: (a) To learn about the put-together story about $3 + 3$ and understand why it does not have a story to go with it to make a pair; and (b) to have further experiences with the other facts that have sums of 6.

New Word: *playing*

Book Lesson

Ex. 1. The procedure follows the established plan. However, very definite attention must be given to why there is no other story to make a pair. The child is to draw a ring around *No* in response to the question, "Can $3 + 3 = 6$ have a story to make a pair?" If necessary, illustrate this manipulatively in connection with this exercise.

Ex. 2. Emphasize again, as in Ex. 1, why there is not another story to make a pair.

Ex. 3-4. These exercises review the put-together stories in pairs that were introduced and studied on the two previous pages. The children may work independently on these exercises.

Differentiations and Extensions

1. Add the cards for the representative drawing of the component parts 3 and 3, as well as for the combination $3 + 3 = \underline{\quad}$ to the "Pair-O" deck of cards suggested on Teaching Book One Page 28. Then have the children play the game with the new cards included.

2. Duplicate work sheets giving material such as that shown below, as a way of summarizing the pairs of put-together stories involving 6.

	$\underline{\quad} + \underline{\quad} = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
	$\underline{\quad} + \underline{\quad} = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
	$\underline{\quad} + \underline{\quad} = \underline{\quad}$
	$\underline{\quad} + \underline{\quad} = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
	$\underline{\quad} + \underline{\quad} = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$

LOOKING AHEAD

These Looking-Ahead activities extend the work with money beyond the suggestions on Teaching Book One Page 20, in anticipation of the written work on Book One Page 57.

1. Show each of the following groups of coins: 6 cents, 7 cents, 8 cents, and 9 cents. Have the children tell the value of each group of coins and write on the chalkboard the values as — 6¢, 7¢, 8¢, and 9¢.

2. In each of the above groups exchange 5 of the cents for 1 nickel, thus bringing out the following:

- 6 cents is the same amount as 1 nickel and 1 cent.
- 7 cents is the same amount as 1 nickel and 2 cents.
- 8 cents is the same amount as 1 nickel and 3 cents.
- 9 cents is the same amount as 1 nickel and 4 cents.

3. Have the pupils play store as suggested on Teaching Book One Page 20. Mark objects for all amounts from 1¢ through 10¢ and permit purchases with any appropriate combinations of coins. Things costing 5¢ may be paid for with either 5 cents or 1 nickel. Things costing 10¢ may be paid for with 1 dime or 10 cents or 1 nickel and 5 cents or 2 nickels. If the clerk is satisfied with the correctness of the money offered, he gives the buyer the thing he has purchased.

NOTES

The Put-Together Story about $3 + 3$



— girls playing. — girls not playing. Finish the story.

3 girls + — girls = — girls $3 + \underline{\quad} = \underline{\quad}$

Can $3 + 3 = 6$ have a story to make a pair? Yes No

2. How many are here? — Draw 3. Write the put-together story.



$\underline{\quad} + \underline{\quad} = \underline{\quad}$

3. How many are here? — Draw 2. Write the put-together stories.



Write the put-together stories.

$\underline{\quad} + \underline{\quad} = \underline{\quad}$

$\underline{\quad} + \underline{\quad} = \underline{\quad}$

4. How many are here? — Draw 1. Write the put-together stories.



Write the put-together stories.

$\underline{\quad} + \underline{\quad} = \underline{\quad}$

$\underline{\quad} + \underline{\quad} = \underline{\quad}$

Pupil's Objectives: (a) To compare the relative sizes of groups and of objects as a means of getting acquainted with the picture; (b) to use in problem situations the addition facts just studied and others previously studied; (c) to review the pairs of addition facts just studied; and (d) to maintain recognition and recall of abstract addition facts studied recently and those studied earlier.

New Word: *Indians*

Book Lesson

Discuss the picture at the top of the page with the children, having them tell about their own experiences in playing Indian. Then ask specific quantitative questions about the picture, such as:

Which is higher—the tepee or the fence?

Which is smaller—the tom-tom or the tepee?

Are there fewer children sitting on the log than on the ground?

Then say: Now I'm going to pretend that the children in the picture are Indians and tell you some number stories about them. Listen carefully to each story, then write the put-together story about the Indians. The picture at the top of the page will help you with the first two stories. The other four stories are about Indians, too, but not about the ones you see in the picture.

47

Do You Know These Put-Together Stories?



1. — Indians + — Indians = — Indians

2. — Indians + — Indians = — Indians

3. — + — = —

4. — + — = —

5.	6.
----	----

7.	8.	9.
_____	_____	_____
_____	_____	_____

$$4 + 2 = 2 \text{ (6)}$$

$$2 + 3 = 5 \quad 6$$

$$1 + 5 = 6 \quad 4$$

$$5 + 1 = \underline{\quad}$$

$$1 + 4 = \underline{\quad}$$

$$3 + 2 = \underline{\quad}$$

$$3 + 3 = \underline{\quad}$$

$$3 + 1 = \underline{\quad}$$

$$2 + 4 = \underline{\quad}$$

Also, explain that in Ex. 1–4 the blank spaces are to be filled in with appropriate numerals but in Ex. 5–6 pupils will have to write the entire put-together story each time.

Ex. 1. Four Indians are sitting on the ground. There are 2 others sitting on the log. How many Indians are there in all?

Ex. 2. There are 3 Indian girls with headbands and 2 Indian boys with headbands. How many Indians are there with headbands?

Ex. 3. Two of the Indian boys were playing leapfrog yesterday with 4 other Indian boys. How many Indian boys were playing leapfrog?

Ex. 4. Two Indian squaws were grinding corn and 3 others were making blankets. How many Indian squaws were working these ways?

Ex. 5. Two Indian braves were gathering wood for a campfire. Two other Indian braves were building the fire. How many Indian braves were helping with the campfire?

(If you don't want to use the extension required in Ex. 6, say, "One Indian . . ." instead of "Two Indians . . ." See the paragraphs before Ex. 5–6 on Teaching Book One Page 26.)

*Ex. 6. Five Indians were dancing in a ring. Two other Indians were dancing inside the ring. How many Indians were dancing together?

Next, give children instructions for the work on the remainder of the page and have them complete this independently. Circulate among the children to offer assistance as needed.

Ex. 7–9. The children are to write a pair of put-together stories for each diagram.

Foot of the page. The children are to work the examples downward, column by column. In the first column they are to use the multiple-choice technique, choosing the correct sum from the two given and drawing a ring around it. In the last two columns the correct sum is to be recalled and supplied each time.

Differentiations and Extensions

1. Have *all children* make up put-together stories about Indians based on the picture at the top of the page. Children may take turns telling a story while the other children write the story in numerals and symbols.

2. Provide practice, as needed by *slower learners*, of the type in Ex. 7–9 or at the foot of the page. Do not provide this practice, however, until you have clarified any existing difficulties.

3. For *slower learners* who may need further practice in the recall of addition facts stated in abstract form, have more capable children prepare individual sets of fact cards with sums through 6.

4. Have *all pupils* engage in appropriate games (see *Teachers' Edition* pages 15–25). Selections may be made from the following: *Climb the Ladder* (4); *Fish* (4); *Over Orange* (3); *The Wizard* (8).

Reminder. Remember to provide experiences in which *all pupils* compare the relative sizes of groups and of things (objects), using both the comparative and superlative terms where applicable. Have pupils indicate the larger (largest), smaller (smallest), bigger (biggest), littler (littlest), etc., group or thing.

Have *more capable children* make exact comparisons of group sizes when possible, not only identifying the bigger group, etc., but also telling how much bigger it is than another group.

Be sensitive to opportunities for using in-school and out-of-school activities in connection with these comparison experiences.



Pupil's Objective. To learn about the pair of take-away stories about $6 - 1$ and $6 - 5$.

New Word: *clowns*

Book Lesson

Ex. 1. Say: Look at the picture of the clown band at the top of the page. Tell me some of the things that are funny in the picture. Then say: How many clowns in all do you see in the picture? (6) Write the numeral in the blank space to tell how many clowns in all. Now look at the little clown. Cover the little clown with your hand. How many clowns are left? (5) Now finish the story written the long way. (Write $6 \text{ clowns} - 1 \text{ clown} = \underline{\hspace{2cm}} \text{ clowns}$ on the chalkboard.) Now finish the story written the short way. (Write $6 - 1 = \underline{\hspace{2cm}}$ on the chalkboard.) Now look at the whole picture again. This time cover the 5 big clowns with your hands. How many clowns are left? (1) Finish the take-away story written the long way. Then finish it the short way. Finally, discuss with the pupils the statement:

$6 - 1 = 5$ and $6 - 5 = 1$ make a pair of stories.

Ex. 2-3. In each exercise the children will follow the same series of steps. First, they are to identify and record the number of things in the whole group (6). Then they are to cover the indicated part of the group (5 or 1), find how many are left, and record the resulting take-away story. Finally, the other part of the group is covered, the remainder determined, and the resulting take-away story written. In each exercise be sure to emphasize that the two take-away stories make a pair.

Differentiations and Extensions

1. Add to the "Pair-O" deck (a) the card with the representative drawing of the pattern for 6 with the component parts, 5 and 1, distinguishable in the way indicated on Teaching Book One Page 34; and (b) the cards for the combinations $6 - 1 = \underline{\hspace{2cm}}$ and $6 - 5 = \underline{\hspace{2cm}}$. Have the children play the game now with these new cards included.

2. Have all pupils look for and bring in pictures of groups of 6 that have distinct sub-groups of 5 and 1. Then have the children tell and write the pair of take-away stories that might be derived from the picture: $6 - 1 = 5$ and $6 - 5 = 1$.

3. Let more capable children make up pairs of problems having a common setting that would involve the pair of take-away stories just studied: $6 - 1 = 5$ and $6 - 5 = 1$. For example:

a. Sally had 6 balloons on a table—5 red and 1 green. Sally hid the green balloon behind her. How many balloons were left on the table?

b. Sally had 6 balloons on a table—5 red and 1 green. Sally hid the 5 red balloons behind her. How many balloons were left on the table?

NOTES

48

Take-Away Stories about $6 - 1$ and $6 - 5$



$\underline{\hspace{2cm}}$ clowns in all. Finish the take-away stories.

Cover 1 little clown. $6 \text{ clowns} - 1 \text{ clown} = \underline{\hspace{2cm}} \text{ clowns}$ $6 - 1 = \underline{\hspace{2cm}}$

Cover 5 big clowns. $6 \text{ clowns} - 5 \text{ clowns} = \underline{\hspace{2cm}} \text{ clown}$ $6 - 5 = \underline{\hspace{2cm}}$

$6 - 1 = 5$ and $6 - 5 = 1$ make a pair of stories.



$\underline{\hspace{2cm}}$ in all

Write the take-away stories.

Cover 5. $\underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

Cover 1. $\underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$\underline{\hspace{2cm}}$ in all

Write the take-away stories.

Cover 1. $\underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

Cover 5. $\underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$



Pupil's Objective. To learn about the pair of take-away stories about $6 - 2$ and $6 - 4$.

Book Lesson

Ex. 1. The procedure is identical with that followed on the previous *Book One* page. In *Ex. 1*, have the children first identify and then record the number in the whole group. Then have them finish the take-away stories in the appropriate ways. First, cover 2 children and write the resulting story the long way and the short way. Next, cover 4 children and write this resulting story the long way and the short way. Emphasize the statement:

$6 - 2 = 4$ and $6 - 4 = 2$ make a pair of stories.

Ex. 2-3. First, have the children identify and record the number in the whole group (6). Then have them cover each indicated sub-group in turn and write the corresponding take-away story. Emphasize the idea of pairs of stories.

Differentiations and Extensions

1. Add to the "Pair-O" deck (a) the card with the representative drawing of the pattern for 6 with the component parts, 4 and 2, distinguishable in the way indicated on *Teaching Book One* Page 34; and (b) the cards for the combinations $6 - 2 = \underline{\quad}$ and $6 - 4 = \underline{\quad}$. Have the children play the game with these new cards included.

2. Have all children look for and bring in pictures of groups of 6 that have distinct sub-groups of 4 and 2. Then have the chil-

dren tell and write the pair of take-away stories that might be derived from the picture: $6 - 2 = 4$ and $6 - 4 = 2$.

3. Have more capable children make up pairs of problems having a common setting that would involve the pair of take-away stories just studied: $6 - 2 = 4$ and $6 - 4 = 2$. For example:

a. Tommy had 6 toy boats—4 sailboats and 2 motorboats. He gave Jack the 2 motorboats. How many toy boats did Tommy have left?

b. Tommy had 6 toy boats—4 sailboats and 2 motorboats. He gave Jack the 4 sailboats. How many toy boats did Tommy have left?

NOTES

49

Take-Away Stories about $6 - 2$ and $6 - 4$



— children in all. Finish the take-away stories.

Cover 2. — children - 2 children = — children $6 - 2 = \underline{\quad}$

Cover 4. — children - 4 children = — children $6 - 4 = \underline{\quad}$

$6 - 2 = 4$ and $6 - 4 = 2$ make a pair of stories.



— in all

Write the take-away stories.

Cover 4. — - — = —

Cover 2. — - — = —



— in all

Write the take-away stories.

Cover 2. — - — = —

Cover 4. — - — = —



Pupil's Objectives: (a) To learn about the take-away story about $6 - 3$ and understand why it does not have a story to go with it to make a pair; and (b) to have further experiences with the other facts that have minuends of 6.

Book Lesson

Ex. 1. The procedure follows the plan that the pupils already know. However, very definite attention must be given to the reason why there is no other story to make a pair. The child is to draw a ring around *No* in response to the question, "Can $6 - 3 = 3$ have a story to make a pair?"

Ex. 2. Follow the familiar procedure, but again emphasize the reason why the given story has no story to go with it to make a pair.

Ex. 3-4. These exercises review the pairs of take-away stories introduced and studied on the previous two *Book One* pages. The procedure is familiar and the children may work independently on these exercises.

Differentiations and Extensions

1. Add to the "Pair-O" deck (a) the card with the representative drawing of the pattern for 6 with the component parts, 3 and 3, distinguishable in the way indicated on Teaching *Book One* Page 34; and (b) the card for the combination, $6 - 3 = \underline{\quad}$. Have the children play the game now with all the cards about 6 added to the deck.

2. Duplicate work sheets with material such as that shown below, as a way of summarizing the pairs of take-away stories involving 6. Have pupils use the covering technique. Using the same general form of representation for deriving the pairs of subtraction facts as was used in connection with *Book One* page 46 for the pairs of addition facts will serve to pave the way for the "whole-story" idea to be introduced later.

	$\underline{\quad} - \underline{\quad} = \underline{\quad}$ $\underline{\quad} - \underline{\quad} = \underline{\quad}$
	$\underline{\quad} - \underline{\quad} = \underline{\quad}$ $\underline{\quad} - \underline{\quad} = \underline{\quad}$
	$\underline{\quad} - \underline{\quad} = \underline{\quad}$
	$\underline{\quad} - \underline{\quad} = \underline{\quad}$ $\underline{\quad} - \underline{\quad} = \underline{\quad}$
	$\underline{\quad} - \underline{\quad} = \underline{\quad}$ $\underline{\quad} - \underline{\quad} = \underline{\quad}$

50

The Take-Away Story about $6 - 3$



Cover 3 cars. $6 \text{ cars} - \underline{\quad} \text{ cars} = \underline{\quad} \text{ cars}$ $6 - 3 = \underline{\quad}$

Can $6 - 3 = 3$ have a story to make a pair? Yes No

2.



— in all
Write the take-away story.

Cover 3. $\underline{\quad} - \underline{\quad} = \underline{\quad}$

3.



— in all
Write the take-away stories.

Cover 2. $\underline{\quad} - \underline{\quad} = \underline{\quad}$

Cover 4. $\underline{\quad} - \underline{\quad} = \underline{\quad}$

4.



— in all
Write the take-away stories.

Cover 1. $\underline{\quad} - \underline{\quad} = \underline{\quad}$

Cover 5. $\underline{\quad} - \underline{\quad} = \underline{\quad}$

Pupil's Objectives: (a) To compare the relative sizes of groups and of objects as a means of getting acquainted with the picture; (b) to use in problem situations the subtraction facts just studied and others previously studied; (c) to review the pairs of subtraction facts just studied; and (d) to maintain recognition and recall of abstract subtraction facts studied recently and those studied earlier.

New Word: *bicycles*

Book Lesson

Discuss the picture at the top of the page with the children, having them tell about their own experiences with bicycles. Then ask specific quantitative questions about the picture, such as:

- How many children are there? How many bicycles are there? Is there a bicycle for each child?
- Which is taller—a bicycle or a child?
- Are there fewer bicycles in the rack than in front of the rack?

Then say: Now I'm going to tell you some number stories about bicycles. Listen carefully to each story; then write the take-away story about the bicycles. The picture at the top of the page will help you with the first two stories. The other four stories are about bicycles, too, but not about the ones you see in the picture.

Also, explain to the children that in Ex. 1–4 the blank spaces

are to be filled in with appropriate numerals but in Ex. 5–6 pupils must write the entire take-away story each time.

Ex. 1. Six bicycles were parked in the school yard. Two of them are now being taken away. How many bicycles are still parked in the school yard?

Ex. 2. Four bicycles are still in the bicycle rack. When the two boys take their bicycles from the rack, how many bicycles will be left in the rack?

Ex. 3. Five bicycles were in a race. Two had a collision and were then out of the race. How many bicycles were left in the race?

Ex. 4. Six bicycles were in a repair shop. Four of them were taken home after being fixed. How many bicycles were left in the shop?

Ex. 5. Five bicycles were parked in John's yard. Tim rode one of the bicycles away. How many bicycles were left in John's yard?

(In Ex. 6 use "Six bicycles . . ." instead of "Seven bicycles . . .," if you don't want your pupils to try the extension.)

*Ex. 6. Seven bicycles were decorated for a bicycle parade. Then one of the bicycles could not be used and was taken away. How many bicycles were left for the parade?

Next, give children instructions for the work on the remainder of the page and have them complete this independently. Circulate among the children to offer assistance as needed.

Ex. 7–8. The children are to write a pair of take-away stories using each diagram.

Foot of the page. The children are to work the examples downward, column by column. In the first column they are to use the multiple-choice technique, choosing the correct answer from the two given and drawing a ring around it. In the last two columns, the correct remainder is to be recalled and supplied each time.

Differentiations and Extensions

1. Have all children make up take-away stories about bicycles based on the picture at the top of the page. The children may take turns telling a story while the others write the story in numerals and symbols.

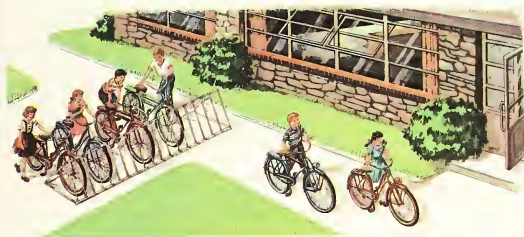
2. Provide additional practice as needed by *slower learners* on the type of work in Ex. 7–8 or at the foot of the page. Do not provide this practice, however, until you have clarified any existing difficulties.

3. For *slower learners* who may need further practice in the recall of subtraction facts stated in abstract form, have *more capable children* prepare individual sets of fact cards with minuends through 6. The children can write a subtraction combination on the front of each card and the complete statement of fact on the back. *Slower learners* and *more capable children* can work in pairs or the cards can be used for individual practice.

4. Have all pupils engage in appropriate games (see *Teachers' Edition* pages 15–25). Selections may be made from the following: *Climb the Ladder* (5); *Fish* (5); *Over Orange* (4); *The Wizard* (9).

51

Do You Know These Take-Away Stories?



1. ___ bicycles – ___ bicycles = ___ bicycles

2. ___ bicycles – ___ bicycles = ___ bicycles

3. ___ – ___ = ___

4. ___ – ___ = ___

5. _____	6. _____
----------	----------

7.	8.
----	----

Cover 1. _____ Cover 2. _____

Cover 5. _____ Cover 4. _____

6 – 5 = 2 (1) 4 – 3 = ___ 5 – 2 = ___

6 – 2 = 3 4 6 – 3 = ___ 5 – 4 = ___

5 – 3 = 2 3 6 – 1 = ___ 6 – 4 = ___

Pupil's Objectives: (a) To recall answers for addition facts and subtraction facts with sums and minuends through 5 when presented in abstract form; (b) to find the total of 3 addends in abstract form when the sum is 5 or less; (c) to state component parts of groups through 6 from representative diagrams; (d) to write pairs of addition facts and pairs of subtraction facts through 6 from representative diagrams; and (e) to write addition and subtraction stories for problems.

New Word: *answers*

Book Lesson. All activities in this test are familiar to the children. First, review with the children what is to be done in each exercise, then let them work independently.

Ex. 1. In each instance, the child is to write in frames a pair of stories about a group and its parts from the representative diagram.

Ex. 2. In each instance, the child is to write the answer to finish the put-together story.

Ex. 3. In each instance, the child is to write the answer to finish the take-away story.

Ex. 4. In each instance, the child is to write the answer to finish the put-together story about 3 groups. Have the children draw representative diagrams in the boxes only if necessary.

Ex. 5. Have the children write the pair of put-together stories for the representative diagram.

Ex. 6. Have the children write the pair of take-away stories resulting from covering the indicated parts of the representative diagram.

After all children have completed Ex. 1-6, read one at a time the following two problems and have the children write the number story for each in the space provided.

Ex. 7. Tommy was holding 5 balloons. Three of them slipped away and sailed up into the sky. How many balloons did Tommy have left?

Ex. 8. Alice had 1 big doll and 3 little dolls. How many dolls did Alice have in all?

Differentiations and Extensions. Provide whatever re-teaching and subsequent practice may be needed for children with deficiencies as revealed by this test. In this connection, use some of your *more capable children* to work in pairs with the *slower learners*.

The *more capable children* can be asked to do things such as the following for use with the *slower learners* who need additional experiences:

- Make a representative drawing to show 4 and 2 as parts of 6.
- Write some unfinished put-together stories having an answer of 5 or less.
- Write some unfinished take-away stories about groups of 5 or less.
- Write some unfinished put-together stories about 3 groups having an answer of 5 or less.

Reminder. Remember to have your children engage in simple put-together and take-away experiences involving appropriate number combinations. The children's in-school and out-of-school activities are filled with problem-solving situations of the simple put-together and take-away variety. See that you utilize such situations to the fullest advantage in developing the children's problem-solving abilities.

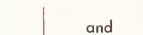
52

Do You Know?

1.



and



and

b.



and



and

c.



and



and

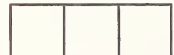
2. Write the answers.

$$2 + 2 = \underline{\quad} \quad 4 + 1 = \underline{\quad} \quad 4 - 3 = \underline{\quad} \quad 5 - 2 = \underline{\quad}$$

$$3 + 2 = \underline{\quad} \quad 1 + 3 = \underline{\quad} \quad 5 - 1 = \underline{\quad} \quad 3 - 1 = \underline{\quad}$$

3. Write the answers.

4. Write the answers.



$$1 + 2 + 1 = \underline{\quad} \quad 2 + 1 + 2 = \underline{\quad} \quad 1 + 2 + 2 = \underline{\quad}$$

5. Write the two put-together stories.



$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

6. Write the two take-away stories.



$$\text{Cover 1. } \underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\text{Cover 5. } \underline{\quad}$$

7.

8.

Discussion of the Third Period of Instruction

Arithmetic Objectives for the Third Period of Systematic Instruction

1. Increased ability to use understandingly words for comparison of sizes and positions and many common quantitative terms other than numbers
2. Increased ability to read numerals—extended to include those through 100
3. Increased ability to write numerals, extended to include those through 100
4. Increased ability to read number words through twelve
5. Increased ability to count by rote—extended as far as 100*
6. Increased ability to use enumeration (rational counting) to identify and reproduce groups—extended to those as large as 100*
7. Increased understanding of the serial order and relative sizes of numbers, extending oral and written experiences with this ability to numbers through 100
8. Increased ability to recognize at a glance groups as large as 10 when regularly patterned
9. Increased understanding and use of ordinals orally through *tenth** with written experiences through *seventh*
10. Increased understanding of the meaning of numbers in terms of the decimal (tens) base of our number system and the notational principle of place value—extended to 100
11. Increased ability to count by rote and to enumerate by multiples with written experiences by 2's to 20 and by 10's to 100 with manipulative experiences by 5's to 50*
12. Increased understanding of cent, nickel, dime, and the ¢ sign, including the relative value of each coin and the value of commonly used combinations of these coins, particularly various combinations of a dime and some cents
13. Increased ability to tell and show time with written experiences on the hour to 12 o'clock with manipulative experiences extended to the half hour*
14. Increased ability to recognize common measuring instruments and occasions for their use
15. Increased ability to recognize objects cut into halves and to identify one half of an object
16. Increased ability to recognize the circle and the square as these forms are seen in connection with natural objects*
17. Increased understanding of groups and numbers as large as 6 in terms of their component parts
18. Increased understanding of the relationship that permits most "stories" about a group or number (as large as 6) and two of its parts to be expressed and written in two related ways
19. Increased understanding of the dynamics of combining and separating, with intelligent control over addition and subtraction facts having sums and minuends as large as 6
20. Increased ability to read and write abstract addition and subtraction facts with sums and minuends as large as 6 in horizontal form with the symbols $+$, $-$, $=$, and extended to include the ability to write such facts in vertical form also
21. Increased understanding of the relationship that permits most addition facts and most subtraction facts to be written in related pairs, developed in abstract form with sums and minuends as large as 6
22. Understanding of the relationship that permits pairs of addition facts and pairs of subtraction facts to be organized together in "whole stories"*

*These objectives are developed orally, because either the *Book One* pages do not lend themselves well to the learning in question or the work serves as readiness for written experiences to come later in the program.

23. Mastery of addition and subtraction facts having sums and minuends as large as 5, with progress toward mastery of addition and subtraction facts having sums and minuends of 6
24. Increased ability to combine three groups with sums not exceeding 5, extending the ability to read and write such "stories" in both horizontal and vertical form
25. Extending understanding of the relationship involved when 1 is added to a number, developed as far as sums of 10
26. Extending understanding of the relationship involved when 1 is subtracted from a number, developed as far as minuends of 10
27. Increased ability to deal with simple problem situations involving combining and separating, extended to include problems read by the child himself as well as those read orally by the teacher
28. Increased disposition to use, and a stronger habit of using, number in practical ways*
29. Increased possession of desirable emotionalized responses with respect to arithmetic—favorable attitudes, appreciations, and values*

Discussion of the Objectives

Again, as was true for the second period of systematic instruction, an examination of the objectives above for the third period will impress you with the emphasis to be put on continuity in learning. Many of the objectives for this period call for little more than the maintenance of ideas and skills already taught, while others call only for easily made extensions of the same. Only a few objectives involve much that is really new.

Objective 1. You have been given responsibility, up to now with little or no help from the work-text, to teach and maintain a vocabulary of terms other than numerals used for comparing sizes and for expressing amounts. However, on *Book One* page 68, two of the most common words are represented in written exercises: *heaviest* and *tallest*. The same exercises can be made to serve the purpose of teaching the two corresponding comparative-degree terms, *heavier* and *taller*.

It will be well for you from time to time to give occasion for the use of other words of this kind you have taught. (See the lists on *Teachers' Edition* pages 137 and 168.)

The following 19 words of the reading vocabulary, new to the third period of instruction, are not included in the list of comparison and quantitative words suggested for this period:

boxes	fish	nickel	tallest
buys	heaviest	old	them
dime	lines	show	time
each	missing	socks	were
eggs	more	taken	

The following, then, is the list of comparison and quantitative words or terms which we have assigned to the third period:

Oral Vocabulary List for Third Instructional Period

backward	gain	older	soonest
cheap	lose	oldest	tall
cheaper	narrow	pay	taller
cheapest	narrower	paid	young
cost	narrowest	price	younger
even	nearly	soon	youngest
forward	odd	sooner	

Objectives 2 and 3, reading and writing the numerals to 100, is pretty well taken care of through the exercises on *Book One* pages 54 and 55. The organization of the learning steps resembles closely that used in teaching earlier segments of the number series, and the teaching suggestions for these pages should provide adequate guidance.

Objective 4, the ability to read the number words through *twelve* is for this period of instruction merely a maintenance item, since the new words were taught in the previous period.

Objectives 5 and 6 require that your pupils be able to count by rote to 100, an extension from 80, the limit in the second period, and to enumerate to the same point for purposes of identifying and reproducing groups. By using your more capable pupils as aids, you can discover those pupils who do not have this skill and give them the help they need. You will want to do so at once, for on *Book One* page 54 they will have to have command of the number series to 100 if they are to read and study the meaning of these numbers and (soon) to write them. As for enumeration, all children should have some experience in identifying and in reproducing a sample of the larger numbers—not all of them. To the extent possible, these experiences should be functional; that is to say, enumeration should serve a purpose beyond that of testing and the practice of the ability in question. It goes without saying that the work-text cannot be of much help in the teaching represented in these objectives; the work will have to be almost completely oral.

Objective 7 requires little comment. The exercises on *Book One* pages 54 and 55 will provide systematic practice in locating each new number in the series and in determining its size relative to other numbers. Errors in this written work will enable you to detect at once any pupils who are in difficulty.

Objective 8, ability to recognize patterned groups as large as 10, is a maintenance item and nothing need be added other than to suggest that you make sure that your pupils have the group idea when thinking of a number—not the serial idea.

Objective 9, likewise, can be dismissed with a word. In this period, ability to use the ordinals is maintained orally through *tenth* but extended from *sixth* to *seventh* with written experiences. For obvious reasons instruction must be oral for the larger part, first, because it is difficult to provide written exercises based upon an ordered series and, second, because the need for the extended ordinal series is much more likely to be recognized if it is related to practical situations. A reminder for maintenance is included with the suggestions for teaching *Book One* page 66.

Objective 10, increased understanding of the meaning of numbers, is extended in this period of instruction to 100. Your pupils, in acquiring understanding of the numbers 61 to 100 in terms of *tens* and *ones* on *Book One* pages 54 and 55, will engage in activities familiar to them through earlier study of the numbers 21 to 30 and 31 to 60.

Objective 11 involves counting by multiples. The maintenance of the ability to count by 2's to 20 is left to you, except for a Reminder which appears in connection with teaching *Book One* page 67. In connection with the ability to count by 10's to 100, something your pupils will almost certainly know by reason of its common use in play and games, written experiences are provided in connection with *Book One* pages 54 and 55. Study of the numerals in the last column of the number chart on *Book One* page 54 makes a good beginning for the experiences on *Book One* page 55. Looking-Ahead suggestions in connection with teaching *Book One* page 61 provide manipulative experiences for counting by 5's as preparation for written experiences to come later in the program.

Objective 12, the understanding of commonly used coins and their values, has thus far been developed mostly by oral work. In this third period of instruction, written experiences with the cent, the nickel, and the dime, and with the ¢-symbol, are pro-

vided on *Book One* pages 57, 61, and 70. Note that on *Book One* page 57 we ask pupils to identify (from pictured coins) such values as 10¢ (a nickel and five cents), 8¢ (eight cents), and 15¢ (a dime and five cents), as well as to reproduce from pictured coins the amounts 7¢ (a nickel and so many cents) and 16¢ (a dime and so many cents). If these work-text experiences are preceded by manipulative experiences with actual coins—and they should be—the meanings will be established and practical skills will be learned.

Objective 13. Telling time on the hour is reviewed with written experiences on *Book One* pages 61 and 70. In connection with teaching *Book One* page 71, Looking-Ahead activities provide for manipulative experiences with telling time on the half hour.

Objective 14, the ability to recognize common measuring instruments and the occasions for their use, is maintained with manipulative experiences (a reminder on Teaching *Book One* page 56 suggests this) and tested on *Book One* page 70.

Objective 15, understanding of halves (identification only), is reviewed and extended on *Book One* page 56, with review and testing on *Book One* pages 61 and 70. The exercises on *Book One* page 56 (and the Pre-book Lesson) are designed to emphasize the fact that parts of an object are halves only (a) when there are two of them and (b) when the two parts are equal in size. Pictures of correctly divided objects showing halves are deliberately mixed with other objects which do not show halves. Your pupils must know what halves are and what they are not.

Objective 16, ability to recognize the circle and the square, is maintained in this period with manipulative experiences to make sure that your pupils recognize the shapes of these forms. A reminder is given you in connection with the teaching of *Book One* page 56.

Objectives 17–21, the objectives involving maintenance of the study of groups as large as 6, their component parts and the resulting addition and subtraction facts, are extended in this period to include the reading and writing of the facts in pairs both horizontally and vertically in abstract form. The new vertical form is introduced for addition on *Book One* pages 58–59 and for subtraction on *Book One* pages 63–65.

Objective 22 involves the ability to organize pairs of addition facts and pairs of subtraction facts into whole stories about a number and its parts. In this period, for the first time you will start your pupils to thinking along this line by some Looking-Ahead activities in connection with teaching *Book One* page 57. In the next period of instruction written experiences will further develop this ability.

Objective 23 states that you are to expect mastery in this period of the facts with sums and minuends through 5 and to urge your pupils in the direction of mastery of the number facts for 6, but not insist upon their mastery. There will be time for pupils to reach this mastery stage in the fourth period of instruction.

In attaining *Objective 24*, your pupils will extend their work in addition examples with 3 addends to include the vertical form, still with the sum 5. To teach the new form, two pages in the work-text for addition of 2 addends (*Book One* pages 58–59) precede page 60 where three addends are written vertically. The way in which the vertical record is developed on these pages should put the transition from the horizontal record, used up until now, readily within the understanding and ability of your pupils.

Objectives 25 and 26 require the maintenance and extension of two principles. One obtains when we add 1 to a number; the other, when we subtract 1 from a number. In adding 1, in such instances as 2 + 1 and 5 + 1, children are likely to express the principle in some such ways as, "Oh, you just go up one" or "It's just like counting one more" or "It's (the sum is) the next number." The number strip shown on *Book One* page 62 is a help-

ful device to get pupils to think in the last manner; also, in getting them to think in similar fashion in subtracting 1 (as in $4 - 1$, $2 - 1$): "It's (the answer is) the next number before." The number strip for use with subtracting 1 is used on *Book One* page 67. Just how pupils word the principles is unimportant; what is important is that they have systematic methods of thinking.

Objective 27 refers to problem-solving ability. The purpose is to get children to rely more and more upon abstract numerals and less and less upon the manipulation of objects. A beginning with written problems was made in the second period of instruction. In the case of both addition and subtraction in the third period, for problems read by the teacher, pupils write their work horizontally on *Book One* page 53 with no aids (such as representative groups) furnished. On *Book One* page 66 they

write their work again—for problems read by the teacher, horizontally, and for problems they themselves read, in vertical form, where names of the groups (races, fish, boys) are supplied. In the ten problems on *Book One* page 69, the first five are read to the pupils and labels are supplied; the next three are read to the pupils and the work is to be written in short form; and the last two must be read by the children and worked entirely by the children themselves. From what has been said, it should be clear that the program in problem-solving is as carefully graded as is any other phase of the work in *Book One*.

We need say nothing about *Objectives 28 and 29*. These objectives remain, in the third period of instruction, as they have been in each period from the start and will be throughout the whole of *Book One*, highly important goals which must not be neglected.

NOTES

Text Pages and Lesson Plans, Book One Pages 53–71

NOTES

Make notes here of the general things you wish to remember while you are teaching the *Book One* pages of this period of instruction.

Pupil's Objectives: (a) To compare the relative sizes of groups and of objects in the picture as a means of getting acquainted with the page; (b) to extend the ability to differentiate between addition and subtraction requirements in oral problem situations; (c) to work toward mastery of pairs of addition and of subtraction facts with sums and minuends of 6 when presented in abstract form; and (d) to work toward mastery of isolated addition and subtraction facts with sums and minuends through 5 when presented in abstract form in mixed order.

Book Lesson

Ex. 1. Discuss the picture at the top of the page with the children, having them tell about experiences they may have had at the beach. Then, ask specific quantitative questions about the picture, such as:

How many children are there? Are there just as many pails as children?

Put your finger on the pail that is held highest in the air.

Show me which two sailboats seem to be smaller than the others. (You may want to discuss with pupils that the boats may be the same size but the artist drew them smaller to make them seem farther away.)

Are there more girls than boys?

Then say to the children: Now I'm going to tell you some number stories about being at the beach. Some of these will be put-together stories. Others will be take-away stories.

53

1. Put-Together and Take-Away Stories



2.	3.
4.	5.

6. Finish the work to make pairs of stories.

a. $5 + 1 = \underline{\quad}$ b. $4 + 2 = \underline{\quad}$ c. $6 - 4 = \underline{\quad}$ d. $6 - 1 = \underline{\quad}$

7. Write the answers.

$3 + 2 = \underline{\quad}$ $4 - 3 = \underline{\quad}$ $2 + 2 = \underline{\quad}$ $3 + 2 = \underline{\quad}$

$5 - 1 = \underline{\quad}$ $1 + 4 = \underline{\quad}$ $5 - 3 = \underline{\quad}$ $2 + 3 = \underline{\quad}$

$4 - 2 = \underline{\quad}$ $5 - 2 = \underline{\quad}$ $4 - 1 = \underline{\quad}$ $4 + 1 = \underline{\quad}$

You can use the picture to help you write the first two stories, but the picture will not help with the other two stories. After I read each one, write the put-together or the take-away story in its box.

Ex. 2. There are 4 boys and 2 girls playing on the beach. How many children are playing on the beach?

Ex. 3. There are 6 boats sailing in the water. Three of them will come in to the dock. How many boats will then be out sailing?

Ex. 4. Betty saw 5 crabs washed up on the beach. Two of them crawled back into the water. How many crabs were left on the beach?

Ex. 5. Jack found 1 big shell and 4 small shells on the beach. How many shells did Jack find all together on the beach?

Ex. 6. Have the children finish the given addition or subtraction story and write the related story to make a pair of stories.

Ex. 7. The children are to recall and write the missing sum or remainder.

Differentiations and Extensions

1. Have some of the children make up an addition or a subtraction story directly related to the picture at the top of the page. Have the others write the work as a pupil tells his story.

2. Have all children play appropriate games involving mixed addition and subtraction facts in abstract form with sums and minuends through 5.

3. For slower learners who need help with Ex. 6, provide similar examples and let these children draw helping "dot pictures" as they work.

4. Have more capable children tell which addition and subtraction facts in Ex. 7 could or did help them with other addition and subtraction facts in the set, and in what way. (For instance, maybe knowing $3 + 2 = 5$ helped with recall of the answer for $2 + 3 = \underline{\quad}$.)

5. Have all pupils engage in appropriate games (see *Teachers' Edition* pages 15-25). Selections may be made from the following: *Fish* (6); *It* (1), (2), (3); *Number Bingo* (2), (3); *Numberland* (3), (4), (5); *Old Hat* (8); *Spin It* (3); *The Wizard* (10).

Reminder. Extend the work with ordinals to go through seventh. Instructional suggestions were given previously for some ordinal work on Teaching Book One Page 15 and extended on Teaching Book One Page 37.

For oral work, now use some of the following suggestions:

1. Have 7 children—each with a different name—form a line at the front of the room. Ask:

Who is sixth in line? Who is seventh? etc.

In which place in the line is Jack? In which place is Sam? etc.

2. Use ordered arrangements of other things in the classroom and provide experiences similar to those used previously. Include more than 7 objects upon occasion, but do not use an ordinal word beyond seventh at this time.

3. Call attention to other uses of ordinals; for example, the first, second, third, fourth, fifth, sixth, or seventh day of the week or month, etc.

For written work, develop and duplicate appropriate work sheets.



Pupil's Objectives: (a) To extend to 100 the study of numbers in relation to the decimal (tens) base of our system of notation and the idea of place value; (b) to extend to 100 the ability to read and write numerals; (c) to learn the serial order of the numerals; and (d) to understand the relative sizes of the numbers they represent.

Teacher's Preparation. Display the class number chart completed now through 100.

Pre-book Lesson

1. Use bundles of ten and single items and the tens and ones *Number Pockets*. Work chiefly with the structure of the numbers 61–99 in two ways:

a. Show a number, such as 7 tens and 6 ones, with 10-bundles and single items in the *Number Pockets*. Have children tell how many tens and ones and the name of the number. Then, have pupils try to tell you how to write the numeral.

b. Give the name of a number. Have the children help you write the numeral. Then, have them show the number with bundles and single items in the *Number Pockets* and with bundle symbols on the chalkboard, telling the structure of the number in terms of tens and ones.

2. Write pairs of numbers on the chalkboard. (For example, 86, 98, etc.) In some instances ask the children to tell you which represents the larger amount; in other instances, which represents the smaller amount. Also, write groups of three numerals on the chalkboard (for example, 74, 47, 83) and ask children to tell which represents the largest amount and which represents the smallest amount.

Book Lesson

Ex. 1. For each representation, have the children write the number of tens and of ones shown and trace the corresponding numeral.

Ex. 2. For each numeral, have the children trace or make the representation of bundles and ones and write the figures to tell how many tens and ones.

Ex. 3. Have the children write the missing numerals in each empty space.

Differentiations and Extensions

1. Provide additional experiences similar to Ex. 1 and 2 for *slower learners* who need this work. Give special attention to the writing of the numerals.

2. Use the class number chart. Play the game of "What's the Numeral?" Have the children close their eyes. You will cover a numeral and then have them open their eyes to see who can tell what numeral is covered. Repeat with other numerals.

3. Have *all pupils* engage in appropriate games (see *Teachers' Edition* pages 15–25). Selections may be made from the following: *Old Hat* (6), (7); *Over Orange* (6); *Who Am I?*; *The Wizard* (4), (5).

The Numbers from 1 to 100

1. Finish the work.

	8 tens and 4 ones	84
	___ tens and ___ ones	69
	___ tens and ___ ones	96

2. Finish the work.

92		___ tens and ___ ones
63		___ tens and ___ ones

3. Write the numbers.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	
21	22	23		25	26	27	28	29	30
31	32	33	34	35	36	37	38		40
41	42	43	44	45		47	48	49	50
51		53	54	55	56	57	58	59	60
61	62	63	64		66	67	68	69	
	72	73	74	75	76		78	79	80
81	82		84	85	86	87	88		90
91	92	93		95	96	97		99	100

Pupil's Objectives: (a) To develop the ability to count by 10's to 100; (b) to further develop serial order to 100; and (c) to recognize the relative sizes of numbers to 100.

New Word: *missing*

Pre-book Lesson. Use bundles of 10 to develop the counting sequence by 10's: 1 ten, or 10; 2 tens, or 20; 3 tens, or 30; etc., through 10 tens, or 100.

Book Lesson

Ex. 1a. Have children trace over the numerals 10, 20, etc., through 100. Then have various pupils read aloud the row they have traced.

Ex. 1b-1e. Have children write the missing numerals for counting by 10's from the last numeral shown.

Ex. 2. To complete the picture, have children begin at the numeral 65 and draw a continuous line, following the dots in order through 100. Let children identify the picture orally when it is completed.

Ex. 3. Have children draw a ring around the numeral representing the largest amount in each row.

Ex. 4. Have children draw a ring around the numeral representing the smallest amount in each row.

Ex. 5-6. Write the missing numerals. In Ex. 5, pupils fill in the sequence in each row. In Ex. 6, they write the subsequent numeral after each one in the first column and the preceding numeral before each one shown in the second column.

Differentiations and Extensions

1. For *all pupils*, use the class number chart and the completed number chart on the previous page. Read down the last column (10, 20, 30, etc.) and relate this to counting by tens. Also, read down other columns (for example, 3, 13, 23, etc.) and develop the idea that each numeral stands for 10 more than the one above it. Use bundle representations and *Number Pockets* to clarify this, as necessary.

2. For *more capable children*, make work sheets with work similar to Ex. 3 or Ex. 4 on *Book One* page 55, but have the children do *two* things in each row: draw a single ring for the smallest number in the row and a double ring for the largest.

3. For *slower learners*, use work sheets with examples such as —, 57, — in which the children write the numerals before and after a given numeral.

4. Have *all pupils* engage in appropriate games (see *Teachers' Edition* pages 15-25). Selections may be made from the following: *Connecto*; *Cross the River* (5), (6), (7); *Hooked* (3), (4), (5); *Moving Man*; *Out of Order* (3), (4), (5); *Postman* (2); *The Wizard* (6).

NOTES

55

More about 1 to 100

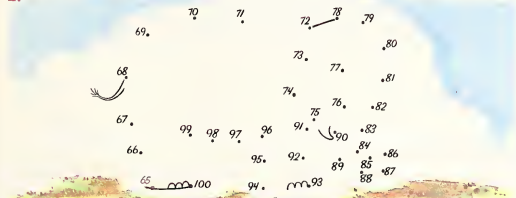
1. Count by 10's.

10 20 30 40 50 60 70 80 90 100

b. 60 70 — — — d. 50 60 — — —

c. 40 50 — — — e. 20 30 — — —

2.



3. 65 99 73 85 4. 56 29 84 65

78 69 92 38 41 37 90 75

93 76 49 88 80 79 65 68

57 71 68 75 78 91 82 69

5. Write the missing numbers.

58 59 — — 62

27 — 29 — —

39 — — 42 —

— 64 — — —

6. Write the missing numbers.

53 — — 38

75 — — 69

84 — — 73

99 — — 14

Pupil's Objective. To develop the ability to identify halves of single objects and to recognize each of the two equal parts of an object as one half.

Pre-book Lesson

1. Use appropriate real objects. As the pupils watch, cut several objects in turn into two equal parts. Associate with each experience the idea of cutting something into *halves* and the fact that each of the two equal parts is *one half* of the whole. Also, by putting the halves together to re-form the whole, bring out the idea that two halves form a whole.

2. Stress the necessity for *equality* of parts by cutting other objects into two parts that are not equal in size, pointing to the fact that such objects have not been cut into halves.

3. Also, cut other objects into three or four equal parts. Call attention to the reason why these equal parts are not halves.

Book Lesson

Ex. 7. This exercise is to be handled orally. Bring out the facts that (a) the girl at the left is cutting the cake into halves because there will be *two equal* parts and each piece is called one half; and (b) the girl at the right is not cutting the cake into halves because the two parts will not be equal and so each part cannot be called *one half*.

Ex. 2-9. Each box shows two things: a whole object and that object cut into two or more parts, equal or unequal. Whenever an object has been cut into halves, the pupil is to draw a ring around each half. Circling both halves emphasizes that there are two. He is to do no marking when an object has not been cut into halves.

Ex. 10. For each flag, have the children encircle *Yes* if the banner of the flag has been divided into halves and *No* if it has not been divided into halves.

Differentiations and Extensions

1. Have *all pupils* tell about in-school and out-of-school experiences in which they have seen halves of single objects.

2. Have *all pupils* bring to school magazine pictures which show halves: for instance, peach halves, pear halves, and so on.

3. Provide a work sheet with material similar to Ex. 10 on Book One page 56 in which other geometric shapes are shown sometimes divided into halves, sometimes not. Have *all pupils* indicate appropriately which things have been divided into halves.

4. Ask *all pupils* to tell what is wrong if they talk about the *bigger (or biggest) half* of something.

5. Find whether the *more capable children* can name the various geometric figures shown on the flag banners.


Reminders


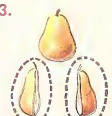


1. Remember to provide experiences with (a) measuring instruments and their uses; and (b) telling and showing time on the hour. Avail yourself of the many opportunities afforded by the children's in-school and out-of-school activities to maintain these quantitative abilities. Be sure to include appropriate work with the calendar in this connection also.





2. Remember also to maintain manipulative activities with some geometric forms—the circle and the square. Make sure that your pupils can recognize these shapes.

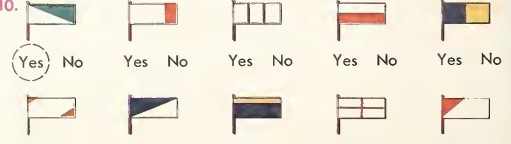
56

Wholes and Halves

1. 

2.  3.  4.  5. 

6.  7.  8.  9. 

10. 

Yes No Yes No Yes No Yes No Yes No

Yes No Yes No Yes No Yes No Yes No

Pupil's Objective. To extend the written work with money by (a) studying relationships among the cent, the nickel, and the dime; and (b) putting the knowledge to work in simple put-together stories and exercises in identification and reproduction.

New Words: *dime, nickel*

Teacher's Preparation. Have sufficient real or facsimile coins available so that each child (or each small group of children) may have: 2 of the dimes, 4 of the nickels, and 10 of the cents. Also have some large cardboard circles marked 1¢, 5¢, and 10¢.

Pre-book Lesson

1. Give 1 of the real or facsimile nickels and 5 of the cents to each child or each small group. Have the pupils identify the coins. Then place 1 cardboard nickel and 5 cardboard cents on the chalk tray or in a card holder and review the fact that 1 nickel is equal in value to 5 cents. Have the children mention various things that can be bought for 1¢, 2¢, 3¢, 4¢, and 5¢.

2. Now, give each child (or group of children) the following additional real or facsimile coins all mixed together: 2 of the dimes, 3 of the nickels, and 5 of the cents. Have pupils identify the dime and emphasize its value as 10¢, bringing out that 1 dime has the same value as 10 of the cents or as 2 of the nickels.

3. Using appropriate coins, show the following values: 6¢ as 1 nickel and 1 cent; 7¢ as 1 nickel and 2 cents; and so on through 10¢ as 1 nickel and 5 cents, or as 2 nickels, or as 10 cents; and so on, to 2 dimes.

Book Lesson. First discuss the picture on the page. This will reinforce the identified equivalents as developed in part of the P. Ex. 1-3. Children should be able to put the *Blue boxes.* In the first row of the blue boxes identify the value of each group of coins. Have the children reproduce each specified drawing a ring around the appropriate kind and number of coins.

Differentiations and Extensions

1. The *more capable children* will profit from discovering various ways in which the same amount of money can be expressed with different coins. A chart with columns headed "Amount," "Dimes," "Nickels," "Cents" can be made easily and will provide a convenient record of discoveries.

2. Have *all pupils* bring in real objects to use as stock for a store. Tag each article, from 1¢ to 20¢. Children may take turns being clerks while other children make purchases. As a general rule, a child makes and pays for only one purchase at a time, and he gives the clerk coins for the exact amount.

3. *More capable children* may use more complex situations:

a. Those with more than one article purchased and the total amount paid with the fewest coins possible.

b. Those in which the buyer gives the clerk something like 2 dimes for a 15¢ purchase and must receive change.

LOOKING AHEAD

The "whole-story" idea receives its first major treatment on *Book One* pages 72-76. The oral activities suggested below serve to prepare children for the later written work.

1. Ask 5 girls to stand at the front of the room. Have 3 of the girls put on hats and stand apart from the other two.

Ask the following questions:

How many girls are in the whole group? (5)

How many girls are wearing hats? (3)

How many girls are not wearing hats? (2)

What parts of 5 do we see in this group? (3 and 2)

Tell me one put-together story about these parts of 5.

Write on the chalkboard whichever story is suggested:

$$3 + 2 = 5 \quad \text{or} \quad 2 + 3 = 5$$

Tell me another put-together story about these parts of 5. Write the other put-together story beneath the first one.

Who can tell me one take-away story about 5 and these parts? Write on the chalkboard, to the right of the two put-together stories, whichever take-away story is suggested:

$$5 - 2 = 3 \quad \text{or} \quad 5 - 3 = 2$$

Tell me another take-away story about 5 and these parts. Write the other take-away story beneath the first one.

How many put-together stories are there about 5 and its parts, 3 and 2? (2)

How many take-away stories are there about 5 and its parts, 3 and 2? (2)

How many stories all together are there about 5 and its parts, 3 and 2? (4)

2. Use similar situations to work with

5 and its parts, 4 and 1 (or 1 and 4);

4 and its parts, 3 and 1 (or 1 and 3);

3 and its parts, 2 and 1 (or 1 and 2);

5 and its parts, 2 and 3 (3 and 2 were used above).

57

Money Numbers

cent	nickel	dime
		
1 cent 1¢	5 cents 5¢	10 cents 10¢
		
5 cents = 5¢	10 cents = 10¢	2 nickels = 10¢

1. 1 nickel = ___ cents 2. 2 cents + 1 cent = ___ cents

1 dime = ___ cents 3 cents + 2 cents = ___ cents

1 dime = ___ nickels 2 cents + 2 cents = ___ cents

3. 10 cents and 1 cent are $\begin{smallmatrix} \text{||||} \\ \text{10} \end{smallmatrix}$ cents. $\begin{smallmatrix} \text{||||} \\ \text{10} \end{smallmatrix}$ ¢

10 cents and 7 cents are ___ cents. ___¢

10 cents and 5 cents are ___ cents. ___¢

		
7¢	16¢	16¢
		



Pupil's Objective. To learn to write familiar put-together of single a new way—the vertical form.

an ob
Key Word: old

Pre-book Lesson

1. On the chalkboard draw a group of 3 balls. Beneath them, draw 1 ball. Ask a child to complete the following put-together story about the balls: balls + ball = balls



2. Now tell the children that they are going to learn a new way to write the put-together story about 3 balls and 1 ball. This time, put on the chalkboard the work in this box, explaining the steps as you go along:

	3 balls
	+ 1 ball
	balls

Then complete the story, writing the sum, 4. Be sure to read the story downward, as "3 balls and 1 ball are 4 balls."

Notice that the picture does not show 4 balls beside the sum, as a total of the 3 balls and 1 ball already shown beside the addends. If this had been done, the pupil would get a feeling of *eighthness* for this fact. He must sense *fourness* from the situation and this is best accomplished by having only four items pictured in the total situation. In real situations, when the child sees 3 items and 1 item, there is no other group of 4 of the same kind of items that he can find as equal to the 3 items and 1 item. Therefore, in the representative pictures accompanying the fact, only the 3 items and the 1 item should show.

To emphasize that the items belong to the total situation and not to just the addends, extend pupil understanding during the Pre-book Lesson by putting some illustrations on the chalkboard that do not have circles directly opposite the addends:

	5
	+ 1
	6

Illustrations like this help to emphasize that the addends 5 and 1 stand for the number of items shown and that the sum 6 also stands for the number of items.

Book Lesson

Ex. 1. Have the children look at the picture of the plates in Ex. 1. Let pupils complete the put-together story in the horizontal form: 2 plates + 1 plate = plates. Then, call attention to the same story written in the box in the new vertical form. Have the children read the story *downward*: "2 plates and 1 plate are 3 plates."

Ex. 2. Follow a similar procedure, in general, for Ex. 2. Note, however, that each put-together story is stated only in abstract symbols. Have the children complete the story the old way and then the new way. Again, emphasize reading the story *downward*: "3 and 2 are 5."

Ex. 3-4. Use Ex. 3a as an illustrative example. Then, have the children work independently on Ex. 3b. Also have the children work independently the parts of Ex. 4, but be ready to give assistance wherever needed. After all of Ex. 4 has been completed by all children, go over each part and have the children

read the put-together stories orally. Be sure that the stories are read *downward*.

Differentiations and Extensions

1. If *slower learners* appear to have difficulty in sensing the relationship between the horizontal and the vertical forms of writing an addition fact, employ the following technique:

First, make a simple drawing of plates on a sheet of paper in the horizontal arrangement of 4 plates and 1 plate. Have the children tell the put-together story and write on the chalkboard in horizontal form: $4 + 1 = 5$

Then, rotate the sheet of paper through 90° so that it shows a vertical arrangement of 4 plates with 1 plate below. Have the children tell the same put-together story and write it on the chalkboard in vertical form this time.



Repeat with other simple drawings as necessary.



2. Have *all children* bring in pictures cut from magazines which show groups arranged one above the other. Have the children tell and write vertically the addition story associated with each picture.

3. For *more capable children*, read some simple put-together problems (from Teaching Book One Pages 26, 32, 38, 47, 51, or 53) and have these pupils write the put-together story for each problem in the new vertical form.



58

New Ways to Write Put-Together Stories


1. 	Find how many plates all together.	New Way
	Old Way	2 plates + 1 plate 3 plates
	2 plates + 1 plate = <u> </u> plates	

2. 	Find how many plates all together.	New Way
	Old Way	3 + 2 5
	3 + 2 = <u> </u>	

3. Find how many all together.

a. 	
2 cups + 4 cups cups	2 cups + 4 cups cups

4. Write the put-together stories the new way.

a. 	b. 	c. 

Pupil's Objective. To move progressively toward increased levels of abstractness in working with put-together stories presented in vertical form.

New Word: *each*

Book Lesson

Ex. 1. Have the children trace over the numerals which tell the put-together story about the picture of representative items in Ex. 1a. Have pupils read the story they have written. Also, emphasize that the addends, 3 and 1, stand for the circles and that the sum, 4, also stands for the circles. Then, have the children work independently on the other parts of Ex. 1. Check oral reading of the completed put-together stories before going to Ex. 2.

Ex. 2. Use Ex. 2a as an illustrative example to enable children to understand the two things to be done in each case: first, finish the put-together story in the "old" horizontal form; then, write the complete story in the box in the new vertical form. Permit independent work on the other parts of Ex. 2. Check the reading of each story. Emphasize that each story is to be read the same way, whether written in horizontal or in vertical form.

Ex. 3. As before, use Ex. 3a for illustrative purposes. Then, permit independent work on the other parts of Ex. 3. In each case two things are to be done: a put-together story is to be completed in vertical form; then the related story to make a pair is to be written in vertical form also. Check the oral reading of each pair of stories after work has been completed.

Ex. 4. Have the children work independently, recalling and writing the answer for each example.

Differentiations and Extensions

1. For *slower learners* who need such, provide additional experiences with exercises of the type used on *Book One* page 59.

2. Have *more capable children* prepare sets of cards so that games played previously with the addition facts stated in horizontal form can now be played with facts stated in vertical form. (See Teaching *Book One* Pages 28, 44, 45, 46.)









3. *More capable children* may prepare addition-fact cards with the combination in vertical form (sums through 6) on one side and the complete statement of fact on the other. *All pupils* may use these cards for practice.

NOTES


59

Writing Put-Together Stories the New Way

1. Write each put-together story the new way.

a.  $\begin{array}{r} 3 \\ + 1 \\ \hline 4 \end{array}$	b.  $\begin{array}{r} \\ + \\ \hline \end{array}$	c.  $\begin{array}{r} \\ + \\ \hline \end{array}$	d.  $\begin{array}{r} \\ + \\ \hline \end{array}$
e.  $\begin{array}{r} \\ + \\ \hline \end{array}$	f.  $\begin{array}{r} \\ + \\ \hline \end{array}$	g.  $\begin{array}{r} \\ + \\ \hline \end{array}$	h.  $\begin{array}{r} \\ + \\ \hline \end{array}$

2. Finish each story. Then write the story the new way.

a. $3 + 2 = 5$  $\begin{array}{r} 3 \\ + 2 \\ \hline 5 \end{array}$	b. $4 + 1 = \underline{\quad}$ $\begin{array}{r} \\ + \\ \hline \end{array}$	c. $2 + 4 = \underline{\quad}$ $\begin{array}{r} \\ + \\ \hline \end{array}$	d. $5 + 1 = \underline{\quad}$ $\begin{array}{r} \\ + \\ \hline \end{array}$
--	--	--	--

3. Finish each pair of stories the new way.

a. $\begin{array}{r} 2 \\ + 1 \\ \hline \end{array}$ $\begin{array}{r} 1 \\ + 2 \\ \hline \end{array}$	b. $\begin{array}{r} 4 \\ + 2 \\ \hline \end{array}$	c. $\begin{array}{r} 1 \\ + 5 \\ \hline \end{array}$	d. $\begin{array}{r} 3 \\ + 2 \\ \hline \end{array}$
--	--	--	--

4. Write the answers.

$\begin{array}{r} 2 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ + 5 \\ \hline \end{array}$
---	---	---	---	---	---	---	---



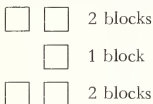
Pupil's Objective. To extend the ability to write put-together stories in vertical form by including situations and examples involving three groups and addends.

Background. In the earlier work involving adding of three addends in horizontal form, the pupils needed to concentrate on this new task as such. Now, when the only new aspect of the task is the carrying out of the procedure in vertical form, there is an optimum opportunity to concentrate on the key skills involved in addition which involves more than two addends. These include especially (a) the steps of thinking involved in adding when there are more than two addends; and (b) the ability to hold an unseen addend in mind (the sum of the first addition) and to add the unseen to the seen (the last addend).

Pre-book Lesson

1. Have available a box with about 8 blocks in it. Ask three children in turn to take the following blocks from the box and put them on the table: 2 blocks, 1 block, and 2 blocks. Have the first child put his 2 blocks at the top of the table; the second child put his 1 block beneath the first 2 blocks; and the third child put his 2 blocks beneath the 1 block.

Then, show on the chalkboard what has been put on the table, writing it in two ways as follows, with diagrams and with symbols:



Then, have the children find how many blocks are on the table by thinking in the following way: 2 blocks and 1 block are 3 blocks; 3 blocks and 2 blocks are 5 blocks. Have one child put together the blocks on the table, starting with those at the top, in a way that parallels the thinking used. Complete the algorithm at the chalkboard, putting the + sign in its proper place and writing the sum after emphasizing the same pattern of thinking in relation to the algorithm. Be certain to have the children start at the top of the column in their thinking and work downward: 2 blocks and 1 block are 3 blocks; 3 blocks and 2 blocks are 5 blocks.

$$\begin{array}{r} 2 \text{ blocks} \\ 1 \text{ block} \\ + 2 \text{ blocks} \\ \hline 5 \text{ blocks} \end{array}$$

2. Repeat this procedure with several other combinations of 3 groups of blocks with a total of 4 or 5 or 6.

Book Lesson

Ex. 1. Use this for illustrative purposes, reminding the children that they have combined three groups before but have written the put-together story in horizontal form. Have the children read each story downward. Also, give particular attention to the thinking pattern involved in finding the answer: 1 car and 2 cars are 3 cars; 3 cars and 1 car are 4 cars or 1 and 2 are 3; 3 and 1 are 4. As you work on this plan of thinking, you may want the pupil to cover the bottom car as he says, "1 car and 2 cars are 3 cars." Then, have the pupil look at the 3 cars and then the bottom car as he says, "3 cars and 1 car are 4 cars."

Ex. 2. Allow the children to work independently on each of the two boxes. In each instance check orally the way in which the children thought in order to find the answer.

Ex. 3. Two things are to be done in each instance. First, the sum is to be written to complete the story in vertical form. Then, the story is to be rewritten in horizontal form on the line below the box. Use Ex. 3a as an illustration. Then permit independent work on the other parts of Ex. 3. Check orally the thinking pat-

tern by which children arrived at each answer. Some children may need to draw circles to help them in these additions.

Ex. 4. Have the children work independently, recalling and writing the answer for each example. Thinking patterns for arriving at the answer can be checked as needed. Let pupils draw circles only when absolutely necessary.

Differentiations and Extensions. If difficulties are encountered by any children, they most likely will occur in Ex. 3 and 4. Here pupils are dealing with abstract symbols exclusively, whereas in Ex. 1 and 2 they could count the total in the representation. Consequently, correct patterns of thinking are particularly important in Ex. 3 and 4.

NOTES



60

Putting Three Groups Together

1. Find how many all together.

			1 car	1
			2 cars	2
			+ 1 car	+ 1
			4 cars	4

2. Finish the work in each box.

<p>a.</p> <div style="display: flex; align-items: center;">  <div> <p>2 balls</p> <p>2 balls</p> <p>+ 2 balls</p> </div> </div>	<p>b.</p> <div style="display: flex; align-items: center;">  <div> <p>balls</p> <p>ball</p> <p>+ balls</p> </div> </div>
--	---

3. Finish each story. Then write the story the old way.

<p>a.</p> $\begin{array}{r} 1 \\ 3 \\ + 1 \\ \hline \end{array}$	<p>b.</p> $\begin{array}{r} 1 \\ 2 \\ + 1 \\ \hline \end{array}$	<p>c.</p> $\begin{array}{r} 2 \\ 2 \\ + 1 \\ \hline \end{array}$	<p>d.</p> $\begin{array}{r} 1 \\ 2 \\ + 2 \\ \hline \end{array}$
---	---	---	---

1 + 3 + 1 = _____

4. Write the answers.

$\begin{array}{r} 1 \\ 1 \\ + 2 \end{array}$	$\begin{array}{r} 3 \\ 1 \\ + 1 \end{array}$	$\begin{array}{r} 2 \\ 2 \\ + 1 \end{array}$	$\begin{array}{r} 2 \\ 1 \\ + 1 \end{array}$	$\begin{array}{r} 2 \\ 1 \\ + 2 \end{array}$	$\begin{array}{r} 1 \\ 1 \\ + 3 \end{array}$	$\begin{array}{r} 1 \\ 2 \\ + 1 \end{array}$
--	--	--	--	--	--	--

Pupil's Objective. To review the following: (a) understanding and knowledge of the serial order of numbers to 100; (b) understanding and knowledge of the decimal structure of numbers through 99; (c) knowledge of monetary values involving the cent, nickel, and dime; (d) understanding, identification, and reproduction of time on the hour; and (e) understanding and identification of halves of single objects.

New Words: *show, time*

Book Lesson. The children have worked previously with each type of activity. At the outset, review what is to be done in each instance. Then, let the children work independently through the page.

Ex. 1. The children are to supply the missing numerals in each series when counting by ones.

Ex. 2. The children are to write the numeral for each number representation.

Ex. 3. The children are to make a representative drawing for each numeral, thus showing its decimal structure.

Ex. 4. The children are to write the value of the coins shown.

Ex. 5. The children are to write the time shown on each clockface.

Ex. 6. The children are to draw both hands on each clockface to show the hour indicated.

Ex. 7. The children are to draw a ring around *Yes* or *No* in each instance to tell whether the indicated object has been cut into halves.

Differentiations and Extensions. Provide necessary reteaching and practice on the basis of difficulties observed as children work through this page. If you need to, use again activities suggested on *Book One* pages 30–31, 37, 56.

LOOKING AHEAD

Your pupils have already had written exercises in counting by 2's and by 10's. These Looking-Ahead activities deal with counting by 5's to 50.

1. Work with small groups. Have 50 buttons or other counters arranged by 5's on the number table. Have the pupils open their texts to *Book One* page 54. Give them pieces of paper of a size so that they can cover the numerals 51–100 in the number chart. Now, as you point to the first group of 5 buttons, have the pupils say, "Five." Find the numeral 5 in the chart and circle it. Then you point to the next group of 5 buttons and, as you push these to combine them with the first 5 buttons, have the pupils say, "Ten." Find the numeral 10 in the chart and circle it. Do the same for 15, 20, 25, and on to and including 50.

2. Use 50 cents (one-cent coins) arranged in groups of 5 and have the children count the coins by 5's.

3. Provide practice in counting other object-groupings by 5's.

4. Have children practice the *rote* counting sequence to 50 by 5's.

5. Have the children play *Cross the River* (1) (see *Teachers' Edition* page 16) with the "stones" numbered by 5's to 50.

6. Have the *more capable children* extend the counting-by-fives sequence to 100.

NOTES

61

Many Things

1. Write the missing numbers.

73 74 — — — 52 — 54 — —
67 — 69 — — 96 — — 99 —

2. Write the number.



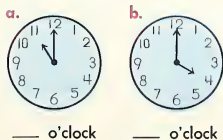
3. Show ϕ 's and l's for each number.



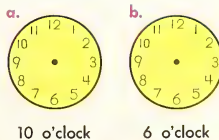
4. Finish the work.



5. What time is it?



6. Show the time.



7.



Pupil's Objective. To develop the important mathematical principal that, when 1 is added to a number, the sum is the next larger number.

New Words: *more, them*

Teacher's Preparation. For use in the game of *Ten Little Indians*, prepare 10 headbands from different colors of construction paper and 10 "feathers" to be inserted in the headbands.

Background. While it seems that children should automatically realize that adding 1 is just like counting to the next number in the series, such is not the case. Yet, when pupils finally recognize this, they have an excellent protection available against errors in adding when one of two addends is 1.

Pre-book Lesson

Use a modification of the *Ten Little Indians* song, but in number-story form. Select 10 children to dramatize the Indian story to be told. Place on each child's head a simple headband and feather made from construction paper of different colors.

Write the numeral series to 10 high on the chalkboard.

Have one of the "Indians" stand at the front of the room. Ask the class, **How many Indians are standing here?** As the pupils respond, point to the 1 in the numeral series.

Then, have a second "Indian" join the first one. Ask the class: **How many more Indians have come here?** (1) **How many Indians are standing here now?** (2) (As they respond, point to 2.) **Tell me the number story about 1 Indian and 1 more Indian.** (1 and 1 are 2.)

Then, have a third "Indian" join the first two. Ask: **How many more Indians have come here?** (1) **How many Indians are standing here now?** (3) (Point to 3) **Tell me the number story about 2 Indians and 1 more Indian.** (2 and 1 are 3.)

Continue in this same manner until all 10 "Indians" are in a line at the front of the room. Then, guide the class to generalize: *Each time one more Indian joined the group, the number of Indians in all then was the next larger number when we count by ones.*

Book Lesson

Ex. 1-3. Read and work through each of these exercises with the children, having them record each number story in both the horizontal way and the vertical way. After finishing these three exercises, ask: **Each time we have put one more car with the group. What is an easy way to tell how many cars we will have each time?** (Just think of the next number when we count by ones.)

Ex. 4. Have the children work independently on these number stories, writing each one in the two ways indicated. Encourage the children to use the principle just mentioned in finding these sums. If it seems necessary to do so, suggest to *slower learners* that they can look at the numbered blocks, 1-10, for help in finding answers.

Then, have *all children* look at the numbered blocks. Ask pupils to do the following:

a. Draw a ring around the numeral that stands for 1 more than 7.

b. Put an X on the numeral that stands for 1 more than 4.

c. Draw a line under the numeral that stands for 1 more than 9.

d. Draw a line over the numeral that stands for 1 more than 6.

e. Draw two rings around the numeral that stands for 1 more than 2.

Ex. 5. Use the first example as a sample, having the children write the "one more" story and also the story that goes with it to make a pair of put-together stories. Let the children work independently on the remaining pairs of stories.

Differentiations and Extensions

1. Let *more capable children* and the *slower learners* work in pairs. The *slower learners* can refer to the row of numbered blocks on *Book One* page 62 and the partner will ask for the numeral which stands for one more than the numeral he names.




2. For *more capable children*, provide an extension of the "one more" principle to numbers through 99 using written examples such as the following:

$$48 + 1 = \quad 52 + 1 = \quad 69 + 1 = \quad 20 + 1 =$$

NOTES

62

One More

1.		Tom has 2 cars together. He puts 1 more car with them. Find how many cars are together.	$\begin{array}{r} 2 \\ + 1 \\ \hline 3 \end{array}$
2.		Tom has 3 cars together. He puts 1 more car with them. Find how many cars are together.	$\begin{array}{r} 3 \\ + 1 \\ \hline \end{array}$
3.		Tom has 4 cars together. He puts 1 more car with them. Find how many cars are together.	$\begin{array}{r} 4 \\ + 1 \\ \hline \end{array}$

4. Finish the put-together stories.

$$5 + 1 = \quad 6 + 1 = \quad 7 + 1 = \quad 8 + 1 = \quad 9 + 1 =$$

$\begin{array}{r} 5 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 1 \\ \hline \end{array}$
---	---	---	---	---

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

5. Finish the pairs of put-together stories.

$$a. 4 + 1 = \quad b. 3 + 1 = \quad c. 5 + 1 = \quad d. 2 + 1 =$$



Pupil's Objective. To learn to write familiar take-away stories in a new way: the vertical form.

New Word: socks

Background. On *Book One* pages 58–60, the children learned to write familiar addition stories in the vertical form. Now, on *Book One* pages 63–65, the children will learn the similar way of writing familiar subtraction stories. The close proximity of this second lesson sequence to the first will simplify learning the new way of writing subtraction stories. We do want to remind you, though, that if you provide manipulative and picture experiences over and above those shown in the pupil's book, the number of objects or pictured items used for an exercise should correspond with the minuend. To show objects for the minuend, then some more for the subtrahend, and some more for the remainder, will be misleading to the pupils.

Book Lesson. Say to the children: **Just a few days ago you learned how to write put-together stories in the new up-and-down way. Today we are going to learn how we can write take-away stories in this new way too. Let's look together at the picture at the top of the page.**

Ex. 1. Have the children identify and record the number of socks in all. Then, have them finish the take-away story in the two familiar *Old-Way* forms at the left, and tell each story orally: "Four socks take away one sock is three socks," and "Four take away one is three." Then have the children look at the take-away story written in two forms in the new way at the right.

Say to the children: **Remember that when we read put-together stories written this way, we started at the top and read the story downward. Let's do the same thing with these take-away stories. Start at the top and read downward.** Have the children read the stories in the following manner: "Four socks take away one sock is three socks," and "Four take away one is three."

SPECIAL NOTE. Be certain that children read the take-away story in the manner suggested, which is identical with the way in which the story is read when written horizontally. There will come a time when children should learn to use other language patterns as well: for example, "Four minus one" or "From four take one" or "One from four," etc. However, this is not the time to develop a variety of language patterns. Use only the one form suggested—the same one that has been used to read the take-away story written in horizontal form. Thus, the only change is in the *written* form of the statement, not in the spoken form of statement.

Ex. 2–3. Work through both examples with the children. After each number story has been completed in horizontal form, have that story read orally. Do the same each time after the pupils are through writing the story the new way—in vertical form. Be certain the children read the vertical form downward, using the same language pattern as when reading the story in horizontal form.

NOTES

63

New Ways to Write Take-Away Stories

1.



— socks in all. Take away 1 sock. Find how many are left.

Old Way

4 socks - 1 sock = — socks

4 - 1 = —

New Way

4 socks	4
- 1 sock	- 1
3 socks	3

2.



— in all. Take away 2.

Find how many are left.

5 hats - 2 hats = — hats

New Way

5 hats

- 2 hats

hats

3.



— in all. Take away 2.

Find how many are left.

6 - 2 = —

New Way

6

- 2



Pupil's Objective. To develop further the ability to write familiar take-away stories in the new vertical form.

Book Lesson

Ex. 1. Have the children trace over the numeral standing for the number of doll beds in all. Have them "take away 3," by doing any one of these things: (a) simply *think* the 3 items away or (b) cross out the 3 items to be taken away or (c) cover the 3 items to be taken away. Here and in the work to follow, careful observation of the method used by individual children will reveal the level at which each pupil is working most commonly. Then, have pupils find how many are left, trace over the numerals, and fill in the answer at the right to complete the story in vertical form. Then, have the children read the number story aloud.

Ex. 2. Use this as a second illustrative example. This time, however, the children must write the complete number story in vertical form without having part of it there to trace over. When writing the story, be certain that the children do not forget to write the take-away sign ($-$) as well as the numerals. Have the children read the number story orally when they have finished writing it.

Ex. 3-4. Allow the children to work independently on these exercises. Circulate among the children, giving assistance as needed. Be observant of the level at which children "take away" the specified groups and look for those children who may need to be reminded to write the take-away sign ($-$) as part of each number story. Have the children read each story orally after work has been completed on Ex. 3 and 4.

Have the children look back over the examples they have written and note that the following things are true in each case:

- The top numeral tells how many in the whole group—how many in all.
- The numeral beneath it tells how many in the part of the group that is taken away.
- The answer tells how many in the part of the group that is left.

Differentiations and Extensions

1. If *slower learners* appear to have difficulty sensing the relationship between the horizontal and the vertical forms of writing a subtraction fact, employ the following technique which is similar to the one suggested for *Book One* page 58 for the vertical form of writing addition facts:

First, make a simple drawing of 5 marbles on a sheet of paper, showing them in pattern arrangement with the 2 marbles at the right side blackened. Have the children tell the take-away story when we take away the 2 black marbles. Write it on the chalkboard in horizontal form.

Then, rotate the sheet of paper through 90° so that the black marbles appear at the foot of the 5 pattern. Have the children tell the same take-away story and write it on the chalkboard in vertical form this time.

Repeat with other simple drawings as necessary.

2. Have *all pupils* bring to class pictures cut from magazines which show groups of sizes as large as 6 in number. For each picture, have the children darken part of the group and then write vertically the subtraction story associated with taking away that part of the group.

3. For *more capable children*, read some simple take-away problems and have these pupils write the take-away stories in the new vertical form.

64

Writing Take-Away Stories the New Way

1.



6 in all. Take away 3.
Find how many are left.
Write the story the new way.

6
- 3
—

2.



— in all. Take away 2.
Find how many are left.
Write the story the new way.

3.



— in all. Take away 4.
Find how many are left.
Write the story the new way.

4. Write the take-away stories the new way.

a.



Take away 2.

b.



Take away 3.

c.



Take away 1.

d.



Take away 4.

e.



Take away 3.

f.



Take away 5.

Pupil's Objective. To extend, in the direction of progressively greater abstractness, experiences with writing take-away stories in vertical form.

Book Lesson

Ex. 1. Use the first example in this set for illustrative purposes, permitting the child to take away the 2 at his own level (thinking it or by covering or by crossing out). Then, permit the children to work independently on the other parts of Ex. 1.

Ex. 2. Again, use the first example for illustrative purposes. Have the children first complete the take-away story in horizontal form, then rewrite the story in vertical form, tracing the numerals shown. Then, permit the children to work independently on the other parts of Ex. 2. Allow the use of dot pictures or the like by children who need such assistance.

Ex. 3. As before, use the first example for illustrative purposes. Have the children complete the given take-away story by tracing and then trace over the related story to make a pair of take-away stories. Permit independent work on the other parts of Ex. 3. Allow use of helping dot pictures if needed.

Ex. 4. Have the children work independently on this abstract practice.

b. If these children "take away" sub-groups by covering or crossing out, provide further practice of the type in Ex. 1 on *Book One* page 65 and encourage use of a higher level of "taking away," preferably thinking it.

c. If further experience is needed in the relation between horizontal and vertical forms of writing subtraction stories, have these pupils rewrite in horizontal form each example in Ex. 4.

d. If they are uncertain of subtraction facts in abstract form, have these children work with appropriate sets of cards for abstract practice stated in vertical form.

2. For *more capable children*:

a. Have them suggest other language patterns that might be used in reading the vertical take-away stories, being certain that the meaning of each language pattern is understood clearly.

b. Have children prepare the necessary sets of cards so that games played previously with the subtraction facts stated in horizontal form now can be played with facts stated in vertical form. (See *Teaching Book One* Pages 34, 48, 49, 50.)

c. These children may prepare subtraction-fact cards with the combination in vertical form (minuends through 6) on one side and the complete statement of fact on the other. These cards may be used for practice by *all pupils*.

NOTES

Differentiations and Extensions







1. For *slower learners*:

a. If they are uncertain about reading take-away stories the new way, provide additional oral practice with examples from *Book One* page 65.

65

Writing Take-Away Stories

1. Write the take-away stories the new way.

<p>a. </p> <p>Take away 2.</p>	<p>b. </p> <p>Take away 3.</p>	<p>c. </p> <p>Take away 3.</p>
<p>d. </p> <p>Take away 2.</p>	<p>e. </p> <p>Take away 5.</p>	<p>f. </p> <p>Take away 4.</p>

2. Finish each story. Then write the story the new way.

<p>a. $5 - 2 = 3$</p>	<p>b. $4 - 3 = \underline{\quad}$</p>	<p>c. $6 - 1 = \underline{\quad}$</p>	<p>d. $6 - 4 = \underline{\quad}$</p>
----------------------------------	--	--	--

3. Finish the pairs of take-away stories the new way.

<p>a. $\begin{array}{r} 5 \\ -4 \\ \hline 1 \end{array}$</p>	<p>b. $\begin{array}{r} 6 \\ -1 \\ \hline \end{array}$</p>	<p>c. $\begin{array}{r} 5 \\ -3 \\ \hline \end{array}$</p>	<p>d. $\begin{array}{r} 6 \\ -4 \\ \hline \end{array}$</p>
---	---	---	---

<p>4. $\begin{array}{r} 5 \\ -2 \end{array}$</p>	<p>$\begin{array}{r} 4 \\ -1 \end{array}$</p>	<p>$\begin{array}{r} 6 \\ -2 \end{array}$</p>	<p>$\begin{array}{r} 5 \\ -1 \end{array}$</p>	<p>$\begin{array}{r} 6 \\ -5 \end{array}$</p>	<p>$\begin{array}{r} 6 \\ -3 \end{array}$</p>	<p>$\begin{array}{r} 4 \\ -2 \end{array}$</p>	<p>$\begin{array}{r} 5 \\ -4 \end{array}$</p>
---	--	--	--	--	--	--	--



Pupil's Objectives: (a) To compare the relative sizes of groups and of objects in the picture as a means of getting acquainted with the page; and (b) to extend the ability to differentiate between addition and subtraction requirements in oral and written problem situations.

New Words: *fish, were*

Pre-book Lesson

1. Remind the children that the problem situations they have studied may be of two kinds:

(a) those in which we must answer the question asked by putting two numbers or groups together and finding how many there are in all;

(b) those in which we must answer the question asked by taking away part of a group and finding how many there are in the part that is left.

2. Give some demonstrations with groups of items in which you silently dramatize and pupils tell you that the story is "4 pencils and 2 pencils are 6 pencils," or whatever.

Book Lesson

Talk with the children about what they see in the picture at the top of the page. Have the children relate some of their own picnic experiences. Then ask specific quantitative questions about the picture, such as:

How many people do you see having a picnic? Have as many hot dogs been cooked as there are people?

Which is taller—the fireplace or the lady?

Which is shorter—one of the hot-dog forks or the table?

Then say to the children: I'm going to read some problems about picnics. You are to write in its box the number story for each problem. Some of them will be put-together stories and others will be take-away stories. Listen to each problem carefully when I read it. You can use the picture to help you with the first two problems. The next four problems will be about a picnic but not about the picnic you see in the picture.

Ex. 1. There are 4 people helping with the fire and 2 people helping at the table. That is how many people helping in all?

Ex. 2. There are 5 hot dogs on the table. The boys will eat 3 of them. How many hot dogs will be left on the table then?

Ex. 3. Tony ate 1 hamburger sandwich and 3 hot-dog sandwiches. How many sandwiches did Tony eat?

Ex. 4. Jack toasted 2 marshmallows for himself and 4 marshmallows for his sisters. How many marshmallows did Jack toast in all?

Ex. 5. Five hamburgers were cooking on the fireplace grill. Two of them dropped through the grill into the fire. Then how many hamburgers were still cooking on the grill?

(If you don't want to use the starred problem for extension, say, "Sue put 6 . . ." instead of "Sue put 7 . . ." See the paragraphs before Ex. 5 on Teaching Book One Page 26.)

*Ex. 6. Sue put 7 paper plates on the table. The wind blew away 3 of them. How many paper plates were on the table then?

Ex. 7-9. Have the children read each problem independently and then write the appropriate number story. Give help with reading for children who may need such. The vocabulary is controlled and should give little trouble to most pupils.

Differentiations and Extensions

1. For *slower learners* who may encounter difficulty, do either or both of two things, whichever is appropriate:

a. Go back over selected problems and give assistance in determining whether to write put-together or take-away stories.

b. Show how the children may use dot pictures to assist them in finding the answers and writing the stories.

2. Have your *more capable children* make up additional picnic problems to be used with children who need further practice.

Reminder. Extend the work with ordinals through *tenth*, but on an oral, manipulative basis only. Use instructional suggestions similar to the following:

a. Have as many as 10 children—each with a different name—form a line at the front of the room. Ask:

Who is *eighth* in line? Who is *fourth*? etc.

In which place in the line is John? In which place is Barbara? etc.

b. Use ordered arrangements of other things in the classroom and provide experiences similar to those used previously. Include more than 10 objects upon occasion, but do not use an ordinal word beyond *tenth* at this time.

c. Call attention to other uses of ordinals; for example, the *first, second, fourth, eighth, or tenth* day of the month, etc.

d. Maintain the written work with ordinals through *seventh* as occasion permits.

Using Put-Together and Take-Away Stories



1.	2.	3.
4.	5.	6.

7. The boys ran in 3 races and the girls ran in 2 races. How many races did the children have all together?

races

races

races

8. The children saw 6 fish in the water. Then 4 fish went away. Find how many fish were left.

fish

fish

fish

9. Five boys were playing together. Then Donald came. Find how many boys were playing together then.

boys

boy

boys

Pupil's Objective. To develop the important mathematical principle that when 1 is subtracted from a number, the remainder is the next smaller number.

New Words: eggs, taken

Pre-book Lesson. Use the *Ten Little Indians* story in a way now the reverse of that used in connection with *Book One* page 62.

First write on the chalkboard the numeral series 1 to 10.

Then have 10 "Indians" stand at the front of the room. Ask the class, **How many Indians are there in all?** As the pupils respond, point to the 10 in the series on the chalkboard.

Have 1 of the "Indians" sit down. Then ask the class: **How many Indians went away? (1) How many Indians are left? (9) (Point to the 9 on the chalkboard.) Tell me the story about 10 Indians take away 1 Indian. (10 take away 1 is 9.)**

Continue in this manner until only 1 "Indian" is left. Then work toward this generalization: *Each time we took away 1 Indian, the number of Indians left was the next smaller number (the one before).*

Book Lesson

Ex. 1-2. Work carefully through these exercises with all children, having them record the number in all, the number taken away, and the number left.

Ex. 3-5. Have the children work independently, but use Ex. 3 for illustrative purposes if you feel that to be necessary. After the children have finished these exercises, say: **Each time you took away 1. What was the easy way you used to find**

the answer each time? (Think of the number that comes just before.)

Ex. 6. Have the children work independently on these four exercises. Encourage the children to use the principle just mentioned in finding these remainders. If it seems necessary to do so, suggest to *slower learners* that they can look at the row of numbered blocks, 1-10, for help in finding answers.

Then have all children look at the numbered blocks. Ask them to do the following:

- Take 1 away from 7. How many are left? Draw a ring around the numeral that tells how many are left.**
- Take 1 away from 4. How many are left? Put an X on the numeral that tells how many are left.**
- Take 1 away from 10. How many are left? Draw a line under the numeral that tells how many are left.**
- Take 1 away from 2. How many are left? Draw a line over the numeral that tells how many are left.**
- Take 1 away from 5. How many are left? Draw two rings around the numeral that tells how many are left.**

Ex. 7. Use the first example for illustrative purposes, having the children write the "one less" story and also the story that goes with it to make a pair of take-away stories. Let the children work independently on the remaining pairs of stories.

Differentiations and Extensions

- Have all pupils sing *Ten Little Indians* in the reverse order: "10 little, 9 little, 8 little Indians," etc.
- Let the *more capable children* and the *slower learners* work in pairs. The *slower learners* can refer to the row of numbered blocks on *Book One* page 67 and the partner will ask for the numeral which stands for one less than the numeral he names.
- For *more capable children*, provide an extension of the "one less" principle to numbers through 100, using written examples such as the following:

$$74 - 1 = \underline{\quad} \quad 38 - 1 = \underline{\quad} \quad 90 - 1 = \underline{\quad} \quad \text{and so on.}$$

Reminders

1. Remember to provide experiences dealing with various abilities associated with the numbers to 100, such as:

- rote and rational counting
- serial order of numerals
- reading and writing numerals
- tens-and-ones structure of numbers
- relative sizes of numbers

Take advantage of opportunities that arise in connection with in-school and out-of-school activities in which the children engage.

2. Remember also to provide appropriate rote and rational counting experiences for counting by 2's to 20 and by 10's to 100.

NOTES

67

One Less



10 eggs in all
1 is taken away.

Find how many are left.

$$10 - 1 = \underline{9}$$



— eggs in all
— is taken away.

Find how many are left.

$$9 - 1 = \underline{\quad}$$

3.



Take away 1.

$$8 - \underline{\quad} = \underline{\quad}$$

4.



Take away 1.

$$7 - \underline{\quad} = \underline{\quad}$$

5.

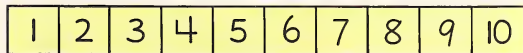


Take away 1.

$$6 - \underline{\quad} = \underline{\quad}$$

6. Take away 1. Finish the stories.

$$5 - 1 = \underline{\quad} \quad 4 - 1 = \underline{\quad} \quad 3 - 1 = \underline{\quad} \quad 2 - 1 = \underline{\quad}$$



7. Finish the pairs of take-away stories.

a.

$$\begin{array}{r} 5 \\ -1 \\ \hline \end{array}$$

b.

$$\begin{array}{r} 6 \\ -1 \\ \hline \end{array}$$

c.

$$\begin{array}{r} 4 \\ -1 \\ \hline \end{array}$$

d.

$$\begin{array}{r} 3 \\ -1 \\ \hline \end{array}$$

Pupil's Objective. To compare three items in each of several pictures and then identify and mark the *tallest* or the *heaviest*, depending on the direction given.

New Words: *heaviest, tallest*

Pre-book Lesson

1. Using things in the classroom, clarify the meaning of *highest*, or *tallest*. Start with objects that can be grouped together to facilitate the comparison—three children in a row, three piles of books on a table; and then proceed to things more widely separated from each other.

2. Similarly, use things within the classroom situation to clarify the meaning of *heaviest*. First, be sure to use objects (*a*) that can be lifted and (*b*) that differ in weight in appreciable amounts. Lead to initial judgments of heaviness based on their size. Emphasize that the largest object is most often the heaviest since, in the Book Lesson to follow, the *heaviest* of three objects must be determined on the basis of size (relative) alone.

Book Lesson

Ex. 1-8. The children are to put an X just above the *tallest* or the *heaviest* in each box. In most instances you will be able to give general directions at the outset and then have the children proceed independently with the work. Read the eight direction lines with the children, emphasizing that in each case the pupils are to find either the *heaviest* or the *tallest* as the case may be. Remind the children that, for these pictures, the *heaviest* will be the biggest one in each instance. As the children work independently, circulate among them to be certain that they are following instructions.

Differentiations and Extensions

1. Have all children engage in other comparison experiences using the pictures on this page. For example, in Ex. 3, 4, 6, and 7, have the children draw a ring around the *lightest* object of the three in each box. In Ex. 1, 2, 5, and 8, have the children draw a ring around the *taller* of the two unmarked objects in each box or the shortest of the three, and so on.

2. Discuss with some of your *more capable children* the idea that sometimes two things may be the same size but have different weights—that is, size is not always indicative of weight.

3. Have all pupils engage in appropriate games (see *Teachers' Edition* pages 15-25). Select from the following: *Moving Man*; *Postman* (2).

LOOKING AHEAD

Your children previously have been reading and writing numerals and working with the structural meaning of numbers to 100. They also have worked with the tens-and-ones idea in connection with dimes and cents. It is appropriate at this point to have some *Looking-Ahead* activities for all pupils to prepare for systematic work beyond the first grade where children will be asked to interpret an amount of money, such as 57¢, in terms of cents with piles of 10's and some 1's and in terms of dimes and cents.

1. Using all cent coins, have available 9 piles with 10 cents in each pile and, also, 9 extra cents. Remind the children how they have learned to show numbers, such as 57, in terms of bundles of ten and some ones. Tell the children that, if we had only cents to work with, it often would be helpful to use the same idea in thinking about and showing amounts of money.

Let the *more capable children* suggest how we might show 57¢ in this way—as 5 piles with 10 cents in each pile and 7 cents

more. Write several other amounts of money on the chalkboard and have each amount represented with piles of 10 cents and some more cents. Then reverse the process—first, show an amount of money in piles of 10 cents and some more cents and have the children identify and write the amount.

2. Now, recall the idea that a dime has the same value as the 10 cents. So, if the children had dimes and cents, they could show amounts of money with these two coins. Have children show the 57¢ now as 5 dimes and 7 cents. Continue with other amounts of money less than 1 dollar. Then, reverse the process as before—first, show 3 dimes and 4 cents, and have children tell the amount of money seen and write: 34¢. Emphasize that, since 1 dime = 10 cents, we are working with “tens and ones” just as we have done before for numbers when we used Φ 's and |'s.

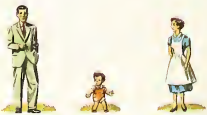
NOTES

Which One?

1. Find the tallest.



2. Find the tallest.



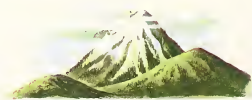
3. Find the heaviest.



4. Find the heaviest.



5. Find the tallest.



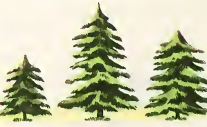
6. Find the heaviest.



7. Find the heaviest.



8. Find the tallest.



Pupil's Objectives: (a) To compare the relative sizes of groups and objects in the picture as a means of getting acquainted with the page; and (b) to develop further the ability to know when to use put-together and when take-away stories in problem situations, including the problems which the pupils have to read.

New Words: boxes, buys

Book Lesson. Talk with the children about the picture and the shopping situation, identifying various things seen—both in kind and amount. Have the children make selected comparisons involving both group sizes (for instance, **On the top shelf are there more boxes or more cans?**) and object sizes (for instance, **Is the bag of coffee on the counter taller or shorter than the can of tomatoes?**).

As you introduce the problem-solving situations, remind the children of what they have done in the past as you have read problems to them. Emphasize that all of problems 1–8 are about a grocery store or supermarket, but that because you want to see if they can work a whole set of problems without help, none of the answers can be found from the picture itself. Emphasize also that some of the problems require put-together stories while others require take-away stories.

Ex. 1. Jane took 3 boxes of cereal from one shelf and 2 boxes of cereal from another shelf. How many boxes of cereal did Jane take from the shelves all together?

Ex. 2. There were 5 boxes of crackers on the shelf. Jane's mother put 3 of them in her shopping basket. How many boxes of crackers were left on the shelf?

69

Using Put-Together and Take-Away Stories

1. $\underline{\quad}$ boxes + $\underline{\quad}$ boxes = $\underline{\quad}$ boxes

2. $\underline{\quad}$ boxes - $\underline{\quad}$ boxes = $\underline{\quad}$ boxes

3. $\underline{\quad}$ glasses + $\underline{\quad}$ glasses = $\underline{\quad}$ glasses

4. $\underline{\quad}$ cans + $\underline{\quad}$ cans = $\underline{\quad}$ cans

5. $\underline{\quad}$ cans + $\underline{\quad}$ cans = $\underline{\quad}$ cans

6. $\underline{\hspace{2cm}}$

7. $\underline{\hspace{2cm}}$

8. $\underline{\hspace{2cm}}$



9. Jane buys 2 yellow apples and 4 green apples. Find how many she has all together.

10. The store has 6 cans of fish. Jane buys 3 of the cans. Find how many cans are left.

Ex. 3. Jane put 2 glasses of strawberry jelly and 3 glasses of raspberry jelly in the shopping basket. How many glasses of jelly did Jane put in the basket?

Ex. 4. Jane's mother bought 4 cans of chicken soup and 2 cans of tomato soup. How many cans of soup did she buy?

Ex. 5. Jane put 3 cans of peaches and 3 cans of pears in the shopping basket. How many cans of fruit did Jane put in the basket?

Ex. 6. There were 5 bags of sugar on a shelf. Jane put 1 of them in the shopping basket. How many bags of sugar were left on the shelf?

(If you do not want to use the starred items as extensions, for *Ex. 7*, use "6" instead of "7"; for *Ex. 8*, use "1" instead of "2.")

**Ex. 7.* Jane put 7 jars of baby food in the basket. Her mother didn't want that many and put 2 of them back on the shelf. How many jars of baby food were left in the basket?

**Ex. 8.* At the check-out counter Jane took 2 packs of lime gelatin and 5 packs of lemon gelatin from the basket. How many packs of gelatin in all did she take from the basket?

Ex. 9–10. Next, have the children read these problems silently and then write the number story about each problem. Give assistance to any children who may encounter vocabulary difficulty.

Differentiations and Extensions

1. If some of your *slower learners* have problem-solving difficulties, let them draw dot pictures or use concrete dynamic representations for selected problems you read to them.

2. Have some of your *more capable children* make up shopping problems based on the picture. Provide *all pupils* with some opportunity to solve these pupil-made problems.

NOTES

Discussion of the Fourth Period of Instruction

Arithmetic Objectives for the Fourth Period of Systematic Instruction

1. Increased ability to use understandingly words for comparison of sizes and positions and many common quantitative terms other than numbers, as evidenced in written as well as oral experiences
2. Increased ability to read and write numerals through 100
3. Increased ability to read number words through twelve
4. Increased ability to count by rote to 100*
5. Increased ability to use enumeration (rational counting) to identify and reproduce groups as large as 100*
6. Increased understanding of the serial order and relative sizes of numbers through 100
7. Increased ability to recognize at a glance the size of regularly patterned groups as large as 10
8. Increased understanding and use of ordinals orally through *twelfth** with written experiences through *seventh*
9. Increased understanding of the meaning of numbers in terms of the decimal base of our number system and the notational principle of place value with written experiences to 100 with manipulative experiences for numbers to 200*
10. Increased ability to count by rote and to enumerate by multiples with written experiences by 2's to 20 and by 10's to 100 with manipulative experiences by 5's to 50*
11. Increased understanding of coins and the sign written experiences with the relative values of cent, nickel, dime, and the values of commonly used coin combinations oral and manipulative experiences with the quarter and its relation to the cent, nickel, and dime*
12. Increased ability to tell and show time with written experiences on the hour to 12 o'clock with manipulative experiences on the half hour*
13. Increased ability to recognize common measuring instruments and occasions for their use
14. Increased ability to recognize objects cut into equal parts and to identify one of the equal parts written experiences with halves and one half manipulative experiences with fourths and one fourth*
15. Increased ability to recognize the circle and the square as these forms are seen in connection with real objects, extended to include the ability to reproduce these forms
16. Increased understanding of groups and numbers in terms of their component parts, including increased ability to express and write most parts "stories" in two related ways:
 - a. to sums and minuends of 6 for all children
 - b. to sums and minuends of 7 for children who are capable
17. Increased control over addition and subtraction facts and ability to read and write these facts in abstract form, both horizontally and vertically
 - a. to sums and minuends of 6 for all children
 - b. to sums and minuends of 7 for children who are capable of this extension
18. Increased understanding of the relationship that permits most addition facts and most subtraction facts to be written in related pairs, and of the relationship that permits pairs of addition facts and pairs of subtraction facts to be organized together into "whole stories"

- a. to sums and minuends of 6 for all children
- b. to sums and minuends of 7 for children who are capable of this extension
19. Mastery of addition and subtraction facts
 - a. to sums and minuends of 6 for all children
 - b. progress toward mastery of facts having sums and minuends of 7 for children who are capable of this extension
20. Increased ability to combine three groups, extended to sums of 6, including the reading and writing of such number "stories" in both horizontal and vertical form
21. Increased understanding of the relationships involved when 1 is added to a number and when 1 is subtracted from a number, developed as far as sums and minuends of 10
22. Increased ability to deal with simple problem situations involving combining and separating, including problems read by the child himself as well as those read orally by the teacher
23. Working with equal groups through appropriate oral and manipulative experiences, developing readiness for the ultimate systematic study of multiplication and division*
24. Increased disposition to use, and a stronger habit of using, number in practical ways*
25. Increased possession of desirable emotionalized responses with respect to arithmetic—favorable attitudes, appreciations, and values*

Discussion of the Objectives

The discussion of many of the objectives for this period can be short because they deal with maintenance and extension of ideas and skills already taught. A few objectives, to be sure, involve new ideas and these we shall endeavor to discuss in full.

Objective 1 involves the ability to use comparison and quantitative terms other than numerals. *Book One* page 77 contains written exercises which, after appropriate Pre-book Lesson experiences, can be used to teach "longer," "longest," "as long as," "taller," "tallest," and "as tall as."

The following 18 words of the reading vocabulary, new to the fourth period of instruction, are not included in the list of comparison and quantitative words suggested for this period:

about	eating	spent	these
bug	flowers	stars	try
canoes	marbles	swings	window
caught	nest	tepees	
dots	orange	there	

The following, then, is the list of comparison and quantitative words or terms which we have tentatively assigned to the fourth period of instruction:

Oral Vocabulary List for Fourth Instructional Period

amount	deepest	one fourth	poorest	tablespoon
center	degree	past	rich	tablespoonful
curved	depth	half past	richer	teaspoon
deep	double	poor	richest	teaspoonful
deeper	fourths	poorer	straight	twice

Objectives 2 and 3 require maintenance of the abilities to read and write the numerals to 100 and to read the number words through *twelve*.

Objectives 4, 5, and 6. You will be reminded to maintain the ability to count by 1's to 100 and to enumerate as needed to this limit. Working with *Book One* page 80 will help pupils to re-

*These objectives are developed orally because either the *Book One* pages do not lend themselves well to the learning in question or the work serves as readiness for written experiences to come later in the program.

member serial order of the numerals to 100 and also the relative sizes of the numbers.

Objective 7 requires maintenance of the ability to recognize regularly patterned groups to 10. You will need to provide practice with pattern cards in oral drill, to maintain the skill.

Objective 8 requires functional use of the ordinals orally through *twelfth* and with written experiences through *seventh*. On Teaching *Book One* page 76, you will be reminded of this work.

Objective 9, understanding the meaning of numbers in terms of tens and ones, is maintained in this period for the numbers to 100 and with manipulative Looking-Ahead experiences (in connection with teaching *Book One* page 78) is extended to the numbers 100 to 200.

Objective 10. While the abilities to count by 2's to 20 and by 10's to 100 are tested on *Book One* page 80, they should be kept alive and "put to work" as often as possible in activities of importance to the children themselves. You will want to maintain also the rational counting by 5's to 50, begun in connection with a Looking-Ahead activity on Teaching *Book One* Page 61.

Objective 11 requires maintenance of the understanding of coins. There are testing exercises with coins on *Book One* page 79, all dealing with values of 10¢, but, for the most part, maintenance of the understandings is left to oral experiences under your direction. In connection with teaching *Book One* page 94, Looking-Ahead activities are suggested for manipulative experiences with the quarter as preparation for written work with it later in the program.

Objectives 12 and 13, the abilities to tell and show time and to recognize measuring instruments and their uses, are to be maintained in this period. Teaching *Book One* Page 77 suggests manipulative experiences for maintenance of the objectives and *Book One* page 79 tests both abilities.

Objective 14 involves recognizing objects cut into equal parts. The understanding of halves and one half of an object, is to be maintained in this period of instruction and is tested on *Book One* page 79. On Teaching *Book One* Page 91, some Looking-Ahead activities with fourths and one fourth are provided as preparation for written experiences to come later in the program.

Objective 15, knowledge of the circle and the square, is increased from recognizing these forms through manipulative activities to reproducing them on *Book One* page 77.

Objectives 16 to 19 involve abilities in understanding, reading, writing, and mastering work with component parts, and the addition and subtraction facts (written horizontally and vertically) (a) through 6 for all pupils and (b) through 7 for those who are capable of this extension. In the third period of instruction we advised you to urge your pupils toward mastery of the number facts with sums and minuends through 6. All your pupils (even the very slowest) should achieve this limit in the fourth period of instruction. Those who are unsuccessful will almost certainly be having difficulty with but a few of the number facts. Discover what those facts are, and give extra help and the practice needed.

Your pupils who are capable of the extension to groups of 7 will discover and learn the component parts of 7: 7 is 1 and 6 (or 6 and 1), 2 and 5 (or 5 and 2), and 3 and 4 (or 4 and 3). The component parts of 7 are isolated and are to be stated in two related ways on *Book One* page 83 and then are used in discovering the pairs of addition and of subtraction facts and in finding "whole stories" on *Book One* pages 84–93.

Your pupils are already familiar with the notion that most addition and most subtraction facts "go in pairs." In connection with those with sums and minuends of 7, there is therefore little that is new. A good deal of space is given in *Book One* to the discovery of the new pairs of facts—*Book One* pages 84 to 87 for the addition facts and *Book One* pages 88 to 91 for the subtraction facts. The pace is therefore slow, and your pupils will be able to

make use of the component parts of 7 which they have learned on *Book One* page 83.

Work with "whole stories" was begun in the third period of instruction with oral experiences but work with written experiences is new—and it is very important. It has to do with relating addition facts and subtraction facts (pairs of each, except in the case of doubles) in order to find the "whole story." For example, the whole story about 6 and its parts 4 and 2 is: *addition facts* (a pair): $4 + 2 = 6$ and $2 + 4 = 6$; *subtraction facts* (a pair): $6 - 2 = 4$ and $6 - 4 = 2$. (Whole stories for doubles have only two stories; for example, for 6 and its parts 3 and 3, the stories are $3 + 3 = 6$ and $6 - 3 = 3$.)

The whole story represents the last stage in organizing the number facts in addition and subtraction. The relationships are important in themselves and they should be learned on this account if for no other reason. But the whole story is also an effective device in the stage just before mastering the separate facts. If one knows that 4 and 2 make 6, he also knows (or can solve) three other relationships involving these numbers in addition and subtraction.

Note how carefully we introduce the written experiences for this new idea. *Book One* pages 72 to 76 develop the idea by using number facts (with sums and minuends to 6) which are already known—the facts themselves, as well as the pairs of facts in addition and subtraction. But one extra step needs to be taken, namely, to tie all four facts (or both facts, in the case of doubles) into the functional unit we call the "whole story." Then, once this idea is understood, it is applied to the addition and subtraction facts for 7 (*Book One* pages 92 and 93).

For those who wish to have their classes extend the work with addition and subtraction facts even beyond those with sums and minuends of 7, some Looking-Ahead activities have been suggested. On Teaching *Book One* Pages 83, 87, 90, and 93, suggestions have been made for manipulative experiences. You should have no difficulty in planning work if you wish to extend such experiences for your class even to groups of 10.

Objective 20, the ability to read and write number stories involving three addends, is extended in this fourth period to include examples with sums of 6, written both horizontally and vertically. This extension should be taken in stride since no new learnings are involved.

Objective 21, the ability to understand the relationships involved when 1 is added to a number and when 1 is subtracted from a number, is to be maintained in this period of instruction. Functional use of the principles is checked, because in abstract examples in the work-text your pupils will have to add 1 to or subtract 1 from a number; and the ability to do so is, after all, the best evidence of grasp of the principles.

Objective 23, the work with equal groups, as readiness for later systematic study of multiplication and division, is cared for by the Looking-Ahead activities suggested on Teaching *Book One* Page 75. Of course, this beginning work is intended to be very elementary but you may be surprised to find how well your pupils can handle it.

Objective 22, like *Objectives 24 and 25*, has been listed for all four periods of the second half grade. Your pupils should become increasingly able to deal with simple problem situations and to do so more and more with abstract numerals and with the basic operations of addition and subtraction. Rather than analyze the sequence of developmental experiences in line with this objective, we suggest that you study carefully what is provided for your pupils on *Book One* pages 78, 81, 87, 94, and 95.

And finally, are your pupils living the arithmetic they know in the practical affairs of their daily living and are they manifesting toward arithmetic the attitudes, appreciations, and values we want them to have?

Text Pages and Lesson Plans, Book One Pages 72-96

NOTES

Make notes here of the general things you wish to remember while you are teaching the *Book One* pages of this period of instruction.



Pupil's Objective. To derive pairs of put-together stories and pairs of take-away stories from the same situation as an introduction to the "whole-story" idea.

New Words: *about, there*

Background. In working with the addition and subtraction processes and facts to date, children have studied the component parts of groups or numbers. Then they have used their knowledge of the component parts of a number in connection with the pairs of addition facts or with the pairs of subtraction facts. The next important developmental step is to relate the pairs of addition facts and pairs of subtraction facts through the use of a whole story. For example: If a child knows that 3 and 2 are parts of 5, he can use this information as the basis for writing the following four related facts:

$$\begin{array}{ll} 3 + 2 = 5 & 5 - 2 = 3 \\ 2 + 3 = 5 & 5 - 3 = 2 \end{array}$$

These four stories make the "whole story" about 5 and its parts, 3 and 2. (5 | 3 and 2)

Book One page 72 and the page which follows (73) introduce children to this whole-story idea. The stories are based on number facts which the children have worked with previously—facts with sums or minuends not exceeding 6. Thus, the only new aspect of the learning experience is the deriving of the pair of addition facts and the related pair of subtraction facts from the one situation, thus finding the whole story. The expression "whole story" is not introduced to the pupil until *Book One* page 73.

Notice that in this beginning work there always are four stories needed to make the whole story. Situations such as $2 + 2 = 4$ and $4 - 2 = 2$ in which only two facts make the whole story are not considered at this time.

Pre-book Lesson

1. Draw a divided rectangle on the chalkboard, similar to the one below. Make it large enough so that a number fact can be written horizontally in each of the four parts of the rectangle.



Have 6 girls come to the front of the room and pretend that they are working together on a project. Have 4 of the girls seated at a table and the other 2 standing at the table. Ask the following: **How many girls are there in all?** (6) **How many are sitting down?** (4) **How many are standing?** (2) **What parts of 6 do the girls represent?** (4 and 2)

Then say, **Tell me one put-together story about these parts of 6.** Write the story ($4 + 2 = 6$ or $2 + 4 = 6$) in the upper left-hand part of the rectangle. Then say, **Tell me the other put-together story about these parts of 6.** Write the other put-together story in the lower left-hand part of the rectangle. Follow a similar procedure for the two take-away stories about 6 and its parts, 4 and 2, writing the one story in the upper right-hand part of the rectangle and the other story in the lower right-hand part. Then ask the following questions: **How many put-together stories did we write about 6 and its parts, 4 and 2?** (2) **How many take-away stories did we write about 6 and its parts, 4 and 2?** (2) **This makes how many stories about 6 and its parts, 4 and 2?** (4)

2. Provide a similar experience using 5 boys—2 seated at the table and 3 standing at the table. Ask similar questions and record the stories as before.

Book Lesson

Ex. 1. Have the children look at and talk about the picture. First, have the children go through the very thorough work with the parts idea, identifying and recording (tracing over) the number of boys in all, the number in boat A and the number in boat B. Then, have them write the story about 4 and its parts (3 and 1) in two ways. Refresh their memories regarding the use of the frame to show a number and its parts. Then have the children complete the two put-together stories and the two take-away stories. Finally, have the pupils complete the last two statements in the exercise, telling how many put-together stories, how many take-away stories, and how many stories all together there are about 4 and its parts, 3 and 1. You may want to use the expression "whole story" as readiness for the expression in written form on *Book One* page 73.

Ex. 2. Have the children attempt to work independently on *Ex. 2* in a similar manner.

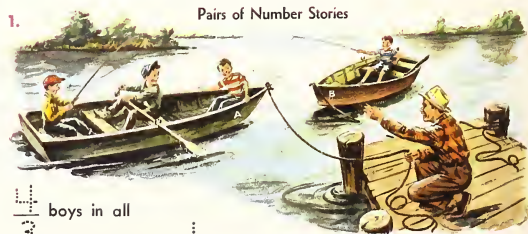
Differentiations and Extensions

1. Further experience with this same idea is provided on *Book One* page 73. Do whatever reteaching may appear to be necessary for *slower learners* before going on to *Book One* page 73. You may wish to go back over the same two exercises, using cutouts on a flannel board or manipulative materials to assist in dramatizing troublesome aspects of this work.

2. Ask your *more capable children* if they can write four stories about each of the following without looking in their books: (a) 4 | 1 and 3; (b) 5 | 2 and 3.

72

Pairs of Number Stories



4 boys in all
3 are in boat A. 1 is in boat B.
4 has the parts 3 and 1. 4 | 3 and 1

Finish the put-together stories. Finish the take-away stories.

$$\begin{array}{l} 3 + _ = _ \\ 1 + _ = _ \end{array}$$

$$\begin{array}{l} \text{Cover 1 boy. } 4 - _ = _ \\ \text{Cover 3 boys. } 4 - _ = _ \end{array}$$

There are 2 put-together stories and ___ take-away stories.

This makes ___ stories about 4 | 3 and 1.

2.

5 fish in all
3 are big fish. 2 are little fish.
5 has the parts ___ and ___. 5 | ___ and ___

Finish the put-together stories. Finish the take-away stories.

$$\begin{array}{l} 3 + _ = _ \\ 2 + _ = _ \end{array}$$

$$\begin{array}{l} \text{Cover 2 fish. } 5 - _ = _ \\ \text{Cover 3 fish. } 5 - _ = _ \end{array}$$

There are ___ stories about 5 | 3 and 2.

Pupil's Objectives: (a) To work toward greater independence in deriving and recognizing whole stories; and (b) to recall and write answers for earlier learned addition and subtraction facts.

New Words: orange, these

Book Lesson

Ex. 1. Use this exercise for illustrative purposes if it is necessary to do so. You may, at least, want to be certain that pupils identify correctly the number in all, 6, and the parts, 5 and 1. At the very least, give special attention to the last line of the exercise. Here the child first encounters the expression, "whole story." Ask the pupils why they think these four stories are called the "whole story" about 6 and its parts, 5 and 1. (These four related stories include *all* the addition and subtraction facts that are based on 6 and its two parts, 5 and 1.)

Ex. 2 may be worked on independently by the children. However, be ready to give assistance where needed. Check the completed work, giving special attention to the use of the expression "whole story."

At the foot of the page. These examples provide mixed practice on the addition and subtraction facts with sums and minuends through 6. Permit the children to work independently on this exercise, but look for evidences of immature methods of solution, such as finger counting and tapping.

Differentiations and Extensions

1. For *slower learners* who may need additional experiences with the whole-story idea at this point, prepare additional prac-

tice material similar to that in Ex. 1 and 2 on *Book One* page 73. Simple drawings—big and little tents, marbles, balloons, etc.—can be used effectively. The following numbers and their parts would be appropriate for additional practice material: 5 and its parts, 4 and 1; 3 and its parts, 2 and 1; 5 and its parts, 2 and 3; 6 and its parts, 2 and 4.

2. Ask some of your *more capable children* if they can write four stories about some numbers and their parts, as suggested previously for *Book One* page 72. The following would be appropriate: 6 | 2 and 4; 6 | 1 and 5; 3 | 2 and 1. You may even want to experiment with 7 | 5 and 2 or 7 | 4 and 3.

3. If children experience difficulty with the mixed practice at the foot of the page, provide appropriate practice experiences by having the children work with their individual fact cards. Then provide additional written practice of the type at the bottom of *Book One* page 73.

NOTES

73

More Pairs of Number Stories

1.

___ in all

___ are orange. ___ is red.

6 | and ___



Write the put-together stories.

___ + ___ = ___

___ + ___ = ___

Write the take-away stories.

Cover 1. ___ - ___ = ___

Cover 5. ___ - ___ = ___

There are ___ stories about 6 | 5 and 1.

These ___ stories make the whole story about 6 | 5 and 1.

2.

___ in all

___ are white. ___ are orange.

6 | and ___



Write the put-together stories.

___ + ___ = ___

___ + ___ = ___

Write the take-away stories.

Cover 2. ___ - ___ = ___

Cover 4. ___ - ___ = ___

There are ___ stories about 6 | 4 and 2.

These ___ stories make the whole story about 6 | 4 and 2.

2	6	1	2	5	4	6	5
+3	-3	+5	+2	-1	+2	-5	-4

Pupil's Objective. To obtain more direct experience in writing the whole story about a number and two of its parts.

New Word: *dots*

Background. Now the children use pictured representations rather than pictures of real things as the basis for discovering and writing about the parts of a group and the related whole story. Here, some of the specific developmental steps used on the previous two pages are eliminated as children move to higher levels of thinking and performance.

Book Lesson

Ex. 1. Work through this exercise carefully with all children together. Have them identify and record the number of dots in all, the number of red dots, and the number of white dots. Then have pupils finish making the record about 3 and its parts, 2 and 1, in the frame: 3 | 2 and 1. Help pupils to read the direction about the whole story they are to write. Then ask them how many put-together stories there are for 3 and its parts, 2 and 1, and have them write the two stories in the spaces provided. Do the same with the two take-away stories about 3 and its parts, 2 and 1. Finally, ask them to read the whole story for 3 and its parts, 2 and 1, and ask how many stories make the whole story.

Ex. 2. Use this as another illustrative example, setting the pattern to be used in Ex. 3-5. Let the children identify and record the number of dots in all, the number of white dots, and the number of red dots. Then solicit the two put-together stories and the two take-away stories which comprise the whole story about 5 and its parts, 3 and 2. Have the children write each story as it is given.

Ex. 3-5. Have the children work independently on these exercises, doing the same thing as in Ex. 2. Circulate among the children, giving assistance as needed.

Differentiations and Extensions. You may want to refer to the Differentiations and Extensions section at the end of the lesson for *Book One* page 75, or you may prefer to wait until your pupils finish that lesson.

74

The Whole Story

1.



3 dots in all

— are red.

— is white.

Write the whole story about 3 | 2 and 1.

3 | and

2 + — = — 3 - 1 = —
1 + — = — 3 - 2 = —

2.



— dots in all

— are white.

— are red.

Write the whole story
about 5 | 3 and 2.

3.



— dots in all

— dots are black.

— dot is red.

Write the whole story
about 5 | 4 and 1.

4.



— dots in all

— dots are red.

— dot is white.

Write the whole story
about 6 | 5 and 1.

5.



— dots in all

— dots are red.

— dot is black.

Write the whole story
about 4 | 3 and 1.

Pupil's Objective. To obtain further experience in writing the whole story about a number and two of its parts.

New Word: *stars*

Background. The major difference between this work and that on *Book One* page 74 lies in the fact that here the whole stories are written in vertical form rather than in horizontal form. Since children already are familiar with both forms of the algorithm, there is no new learning difficulty on this page.

Book Lesson

Ex. 1. Use this example for illustrative purposes, having all children work together with you on it. Let pupils identify and record the number of stars in all, the number of orange stars, and the number of white stars. Then call attention to the fact that the stories which make up the whole story are to be written the up-and-down way this time rather than "across." Have the children verify and trace over each of the stories shown in the boxes.

Ex. 2-6. Permit the children to work independently on these exercises. Be sure to circulate among the children, observing their work and giving assistance as needed.

Differentiations and Extensions

1. Using large cards and at least two different colors of gummed dots or gummed stars, make representations of groups in each of the following ways: 4 in the parts 3 and 1 (or 4 as 1 and 3),

5 in the parts 4 and 1 (or 5 as 1 and 4), 5 in the parts 3 and 2 (or 5 as 2 and 3), 6 in the parts 5 and 1 (or 6 as 1 and 5), and 6 in the parts 4 and 2 (or 6 as 2 and 4). Then do two things with each card: First, place the card in a vertical position on the chalkboard ledge and have *all pupils* write the whole story. Then rotate the card through 180° and have them write the whole story they see in this position. Finally, have the children compare the two whole stories they have written in this way for each card, noting that the whole story is the same each time (except for a possible difference in the order in which the stories comprising the whole story have been written). Also have the children look on *Book One* pages 74-75 and point out representations which illustrate this same idea. For example, on *Book One* page 75, compare Ex. 2 and Ex. 6. Also compare Ex. 4 on *Book One* page 74 with Ex. 5 on *Book One* page 75.

2. If *slower learners* have had difficulty with the work on *Book One* pages 74-75, have them set up some of the representations in different colored materials and then manipulate the items as an aid to discovering the addition and subtraction stories which make up the whole story.

3. Allow the *more capable children* to use cards and gummed dots or stars to make pictures of the parts of 7, 8, 9, and 10. Let them write the whole story for each representative picture.

LOOKING AHEAD

As readiness for later systematic study of multiplication, and also division, it is important that children have Looking-Ahead experiences in recognizing and talking about *equal groups* of things. The activities which follow provide directed experience.

1. Arrange 6 blocks on the table in groups of 3 and 3. Also, show the same arrangement with a representative drawing on the chalkboard.

a. First ask a series of questions such as the following:

How many groups of blocks do you see? (2)

How many blocks are in the first group? (3) How many blocks are in the second group? (3)

How many blocks are there all together? (6)

Who can tell me the put-together story about 3 blocks and 3 blocks? (3 blocks and 3 blocks are 6 blocks.)

b. Then ask a series of questions such as the following:

Look at the blocks again. How many groups of blocks are there? (2)

How many blocks are there in each group? (3) Are the groups equal—with the same number of blocks in each group? (Yes)

Who thinks he can use different words to tell a put-together story about 2 groups of 3 blocks? Solicit the story,

2 groups of 3 blocks are 6 blocks.

c. Review the two kinds of statements the children have made, but do so on a generalized basis without reference to the blocks:

3 and 3 are 6 and 2 groups of 3 are 6

d. Lead children to another way of saying that *2 groups of 3 are 6*; for example, lead to the simpler statement, *two 3's are 6*.

2. Follow a similar procedure using these other groupings:



















a. groups of 2 and 2.

b. groups of 2 and 2 and 2.

3. Finally, contrast the arrangement and expressions associated with 2 groups of 3 with the arrangement and expressions associated with 3 groups of 2, noting particularly that there are just as many all together (6) in each case.

75

More Whole Stories

<p>1.  — stars in all  — is orange.  — are white.</p> <table border="1"> <tr> <td>1</td> <td>3</td> <td>4</td> <td>4</td> </tr> <tr> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> <tr> <td>4</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table>	1	3	4	4	+	+	-	-	4	4	3	3	<p>2.  — stars in all  — are red.  — are blue.</p> <table border="1"> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>					+	+	-	-				
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Pupil's Objective. To try to discover and write whole stories in abstract form.

Background. In all the work on whole stories thus far, children have had representations of some sort as the basis for deriving the addition and the subtraction stories. Now, pupils are led to the higher level in which whole stories are derived and written with no reference to objective representation.

Pre-book Lesson. Write the following addition combination on the chalkboard: $\begin{array}{r} 3 \\ +2 \\ \hline \end{array}$. Ask a child to complete this to make a put-together story. Then, tell the children that we can write one more put-together story and two take-away stories to go with this put-together story to make the whole story about 5 and its parts, 3 and 2. Ask one of the children to write the other put-together story to go with the one we have written. Then do the same with the two take-away stories, helping children to see how one or the other of the put-together stories will give us the clue to the two take-away stories. Keep all explanations at the abstract level of thinking and operation. The relationship among these facts provides an excellent kind of help that the pupils should use, so it is important to concentrate on the relationship.

Book Lesson

Ex. 1-10. Use Ex. 1 and Ex. 5 for illustrative purposes, working in a manner similar to that used in the Pre-book Lesson. Then permit the children to work independently on Ex. 2-4 and Ex. 6-10. Circulate among the children and give assistance as needed. Keep your approach to difficulties at the relational level of thinking and performance if it is possible to do so.

Differentiations and Extensions

1. If some of your *slower learners* encounter too much difficulty in working at the abstract level, permit them to use the following procedures and then move them back into abstract work with the whole stories as such:

Allow them to make dot pictures similar to those on *Book One* page 74, but without using different colors to show the parts. (The parts of the total group are separated spatially.)

Then advance the pupils by giving an example, such as $3 + 2 = \underline{\quad}$. Draw a horizontal line on the board and mark off 3 spaces, putting "3" under the third mark. Then ask how far you would be if you mark off two more spaces. They will often sense this distance and thus get help with $3 + 2 = \underline{\quad}$. Then you can use the discovered fact, $3 + 2 = 5$, as the basis for obtaining the three related facts about 5 and its parts, 3 and 2.

2. For your *more capable children*, provide work-sheet material of the following type in which the first story given is a take-away story rather than a put-together story:

$$\begin{array}{r} 5 - 3 = \underline{\quad} \\ \underline{\quad} - \underline{\quad} = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \end{array}$$

The same thing may be done, of course, with the facts in vertical form rather than in horizontal form.

3. Have *all pupils* play the game *Ask and Draw* (see *Teachers' Edition* page 15).

Reminder. Extend the work with ordinals through *twelfth*, but on an oral manipulative basis only. Use instructional suggestions similar to the following:

1. Have as many as 12 children—each with a different name—form a line at the front of the room. Ask:

Who is *twelfth* in line? Who is *sixth*? etc.

In which place in the line is Jack? In which place is Linda? etc.

2. Use ordered arrangements of other things in the classroom and provide experiences similar to those used previously. Include more than 12 objects upon occasion, but do not use an ordinal word beyond *twelfth* at this time.

3. Call attention to other uses of ordinals; for example, the *first, second, eighth, tenth, eleventh, or twelfth* day of the month, etc.

4. Maintain the written work with ordinals through *seventh*, as occasion permits.

NOTES

76

Can You Write These Whole Stories?

1. Finish each whole story.

$$\begin{array}{|c|c|c|c|} \hline 4 & 1 & & \\ \hline +1 & +4 & = & = \\ \hline \end{array}$$

2.

$$\begin{array}{|c|c|c|c|} \hline 1 & 5 & & \\ \hline +5 & +1 & = & = \\ \hline \end{array}$$

3.

$$\begin{array}{|c|c|c|c|} \hline 2 & & & \\ \hline +4 & + & = & = \\ \hline \end{array}$$

4.

$$\begin{array}{|c|c|c|c|} \hline 1 & & & \\ \hline +3 & + & = & = \\ \hline \end{array}$$

Finish each whole story.

5.

$$3 + 1 = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

6.

$$2 + 3 = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

7.

$$4 + 2 = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

Pupil's Objectives: (a) To learn to apply comparative and superlative terms in a variety of ways to linear distances; and (b) to learn to reproduce the circle and the square.

Pre-book Lesson

1. In relation to objective (a), recall appropriate experiences from the Looking-Ahead section on Teaching *Book One* Page 30 if you feel pre-book work is necessary. In connection with *Book One* page 30 and again at *Book One* page 47, you asked questions using comparative and superlative terms, thus preparing your pupils to think and express comparison ideas about two groups or objects (using the comparative) and about three groups or objects (using the superlative).

2. In relation to objective (b), recall appropriate experiences from the *Looking-Ahead* section on Teaching *Book One* Page 39 if you deem it necessary. There you prepared pupils for recognizing the circle and the square.

Book Lesson

Ex. 1. Ask the children to study lines A, B, C, and D in *Ex. 1* as you tell them what to do. Then say:

Put an X after the shortest line.

Draw a box □ after the longest line.

Draw rings after the two lines that are the same length.

Ex. 2. Tell the children to look carefully at lines A and B.

a. Tell them that they are going to use the dots beside C.

Then say: **Draw a line through the dots beside C so that it is longer than line B (pause) but shorter than line A.**

b. Now tell the children that they will use the dots beside D. Then say: **Draw a line beside D so that it will be the longest one of all the lines in *Ex. 2*.**

Ex. 3. Tell the children to study lines A, B, C, and D in *Ex. 3* as you tell them what to do. Then say:

Put a box at the top of the tallest line.

Draw X at the top of the shortest line.

Draw rings at the tops of two lines that are the same length.

Ex. 4. Tell the children to do the following things for *Ex. 4*:

Through the dots above C, draw a line that is just as tall as line A.

Through the dots above D, draw a line that will be the longest of all the lines in *Ex. 4*.

By this time, your directions can be abbreviated.

Ex. 5. Tell the children to

a. **make line C longer than line A but shorter than line B;**

b. **make line D the shortest line of all the lines in *Ex. 5*.**

Ex. 6. Tell the children to

a. **make line C just as tall as line A;**

b. **make line D taller than line B but not as tall as line A.**

Ex. 7. Tell the children to

a. **put X inside the square;**

b. **put a big dot inside the circle.**

Ex. 8. In the space provided for it, ask the children to draw another of each figure shown. For the square you may say, **draw a square like this (pointing) in the space down here (pointing).** Give a similar direction for drawing the circle.

77

Try These

1.

A _____

B _____

C _____

D _____

2.

A _____

B _____

C

D

3.

A |

B |

C |

D |

4.

A |

B |

C |

D |

5.

A _____

B _____

C

D

6.



A |


B |

C |



D |

7.



8.

Differentiations and Extensions

In relation to *Ex. 1-6*:

a. Have all pupils make statements using the comparative and the superlative regarding things in the classroom.

b. For slower learners, provide further experiences with materials like those in *Ex. 1-6*. For this additional practice, have your more capable children administer the work by giving the slower learners appropriate oral directions of the kind shown in the Book Lesson above. Also, include other forms of comparison statements that apply to groups and objects.

c. Have the more capable children make exact comparisons of group sizes, telling by how much the groups differ.

In relation to *Ex. 7-8*:

a. Have all children identify circles and squares as seen in the classroom. Have your more capable children differentiate these from oval and rectangular shapes. Also, identify the name of the triangle and find triangular shapes in the classroom.

b. Have all pupils draw a square and a circle without the aid of a pattern to copy as in *Ex. 8*.

c. If slower learners had difficulty with *Ex. 8*, give them more patterns as guides for additional practice. Also, provide them with dashed squares and circles to trace over.

d. Have your more capable children draw triangles, ovals, and rectangles.

Reminder. Remember to provide experiences with (a) measuring instruments and their uses, and (b) telling and showing time on the hour. (Since this latter type of experience was extended to include the half hour in an introductory way in Looking-Ahead activities on Teaching *Book One* Page 71, you may wish to maintain that work here.) Work with the calendar also.

Pupil's Objectives: (a) To develop further the ability to solve written problems; and (b) to maintain ability to work with put-together and take-away stories in abstract form.

New Words: *spent, window*

Background. It may be helpful to review the developmental sequence to date that relates specifically to the differentiation between the addition and subtraction processes applied to problem situations. Differentiation between the processes was introduced on *Book One* page 38 and extended on *Book One* page 53. In both these instances all problems were dictated orally by you, the teacher. Further experience in differentiating between the processes in relation to problem situations was provided on *Book One* page 66 and *Book One* page 69. In both these latter instances, however, several problems to be read by the children were included after problems dictated by you. Now, here on *Book One* page 78, all three problems are to be read by each child.

The three problems on *Book One* page 78 are adjusted to gradations of abstract problem thinking so that you may find the variations in your class in levels of ability to imagine changes in the basic situation. In this sense, these problems become diagnostic.

Book Lesson

Ex. 1-3. Talk with the children about the picture of the toy-store window at the top of the page. Have the children identify the various things seen in the picture. Then, unless you are first going to require independent work for diagnostic purposes only, have some discussion regarding problems 1-3. These problems are planned in a sequence of difficulty, so in the discussion you will want to help pupils recognize the following points:

- Problem 1 deals directly with the trucks just as they appear.
- Problem 2 is based on the six ducks in the picture but the pupils must think that 5 of them have been sold.
- Problem 3 has yellow balls and blue balls pictured but those shown are of no help in solving the problem.

Also, help with any reading meanings that may be troublesome. It is better, however, not to stress expressions such as "all together" and "are left." You want the pupils to base their decisions about whether to add or subtract on an analysis of whether the quantities are combined or separated.

Foot of page. Have the children work independently on these examples after completing the three problems.

Differentiations and Extensions

- Have the *more capable children* make up two kinds of problems: (a) put-together and take-away problems that can be solved with the help of the picture at the top of the page; and (b) similar problems that cannot be solved from the picture.

2. Have *all pupils* gain additional problem-solving experience by working some of these made-up problems.

3. Also, have *all pupils* play some of the games they have played previously involving abstract addition and subtraction facts in mixed form. Games such as the following (see *Teacher's Edition* pages 15-25) are appropriate: *Climb the Ladder* (6); *Fish* (6) or *Fish with Bait*; *Guess Again* (3); *It* (3); *Numberland* (5); *Old Hat* (8); *Spin It* (3); *The Wizard* (10); *Who Am I?* (adapted to addition and subtraction combinations).

4. For *slower learners*, you may want to plan various dramatizations of problem situations. By using some toys in your room, you can plan a toy store and have problem experiences with these objects. Always, however, keep nudging the pupils toward using representative pictures, with dots or whatever, and finally toward solving problems without visual aids.

LOOKING AHEAD

At this time it might be feasible to have some Looking-Ahead experiences with the numbers 101 to 200. In this connection, have available 20 single sticks and 19 bundles of 10 sticks.

1. Have the children show with representative items several two-place numbers given orally: for example, 47, 13, 82, 56.

2. Have the children represent 97 with sticks, as above. Then put 1 more stick with the 97 to make 98; then 1 more to make 99; and finally 1 more stick to make 100—as 9 tens and 10 ones. Convert the 9 tens and 10 ones to 10 bundles of 10. Now discuss the fact that so many 10-bundles are hard to handle and the possibility of bundling the 10-bundles together. See if anyone recognizes that the one big group is a 100-bundle, called *one hundred*.

3. Show the number 64 with sticks, keeping the 6 bundles of ten to the left (from the child's point of view) of the 4 ones. Ask, **How many?** Then place a 100-bundle to the child's left of the 6 tens. Ask, **How many do we have now?** Try to elicit the response, "One hundred and six tens and four ones, or one hundred sixty-four."

4. Work with other numbers above 100 in a similar way, but don't use at this time numbers involving zero, such as the following: 101, 102, 103, . . . 110, 120, 130, . . . 200.

5. Finally, work with the numbers such as 103, 106, 107, etc., and the numbers 140, 180, 120, etc., in a similar way.

Using Put-Together and Take-Away Stories



1. In the window there are 2 green trucks and 3 red trucks. Find how many trucks there are all together in the window.

$$\begin{array}{r} 2 \text{ trucks} \\ + 3 \text{ trucks} \\ \hline \end{array}$$

trucks

2. The toy store has 6 toy ducks. The children buy 5 of the ducks. Find how many toy ducks are left in the toy store.

$$\begin{array}{r} \text{ducks} \\ \text{ducks} \\ \hline \end{array}$$

duck

3. Dick spent 4¢ for yellow balls and 2¢ for blue balls. Find how many cents he has spent all together for balls.

$$\begin{array}{r} \$ \\ \text{---} \$ \\ \hline \end{array}$$

¢

Write the answers.

$\begin{array}{r} 6 \\ - 2 \end{array}$	$\begin{array}{r} 2 \\ + 3 \end{array}$	$\begin{array}{r} 3 \\ + 3 \end{array}$	$\begin{array}{r} 5 \\ - 1 \end{array}$	$\begin{array}{r} 4 \\ - 3 \end{array}$	$1 + 2 + 1 = \text{---}$
					$1 + 3 + 1 = \text{---}$
$\begin{array}{r} 6 \\ - 5 \end{array}$	$\begin{array}{r} 4 \\ + 2 \end{array}$	$\begin{array}{r} 4 \\ - 2 \end{array}$	$\begin{array}{r} 1 \\ + 4 \end{array}$	$\begin{array}{r} 6 \\ - 4 \end{array}$	$2 + 1 + 2 = \text{---}$
					$2 + 2 + 2 = \text{---}$

Teaching Book One Page 79 (Test)

Pupil's Objective. To show the extent of these number abilities: (a) identification and reproduction of time on the hour; (b) identification of objects divided into halves; (c) knowledge of coins having a value equivalent to 10¢; (d) recognition of the tallest of several lines; (e) recognition of measuring instruments and identification with their common uses.

Background. The authors have planned the material in *Book One* so that pupils of differing abilities may all be served. Depending on which level of accomplishment your pupils may be able to attain, you may end the year's work by stopping at *Book One* page 82—when pupils have studied and been tested on the addition and subtraction facts with sums and minuends of 6; or, if pupils are able to proceed through the addition and subtraction facts with sums and minuends of 7, you will extend the book work through the remaining pages of *Book One* and end the year's work at *Book One* page 96.

Book One page 79 is the first part of a comprehensive four-page testing sequence provided at this significant point in the fourth period of instruction (completion of the work after studying addition and subtraction facts with sums and minuends through 6). The remaining parts of the test sequence appear on *Book One* pages 80, 81, and 82. Your use of this test material will depend upon the following conditions:

a. For those children or classes that will not be working beyond this point in the fourth period of instruction (completion of the work after studying addition and subtraction facts with sums and minuends through 6), *Book One* pages 79–82 will, in

effect, be an end-of-the-year test. The test material then should be used in conjunction with the End-of-Year Progress Chart described on *Teachers' Edition* page 251.

b. For those children or classes that will be completing the work with sums and minuends of 7, the test material on *Book One* pages 79–82 will be supplemented ultimately by additional test material on *Book One* pages 95–96. Consequently, for these pupils, you may wish to use the present test material in either of several ways:

(1) You may administer all of the test material on *Book One* pages 79–82 at this time as a progress check before going on to the remainder of the teaching pages in *Book One*.

(2) You may wish to bypass the test material on *Book One* pages 79–82 at this time and use it after the pupils work through *Book One* page 94, thus making *Book One* pages 79–82 and 95–96 together a comprehensive end-of-the-year testing sequence.

(3) You may wish to administer some of the test material on *Book One* pages 79–82 at this time and administer the rest at some suitable point(s) in the remaining part of the fourth period of instruction.

Regardless of the way in which you use the test material on *Book One* pages 79–82, be certain that you relate its use to the Progress Chart described on *Teachers' Edition* page 251.

Book Lesson. All activities are familiar to the children. Over-view the entire test, making certain that the children understand the following things to be done:

Ex. 1. Write the numeral that tells the time shown on the clock.

Ex. 2. Draw in the big and little hands on the clockface to show 11 o'clock.

Ex. 3. Draw a ring around *Yes* or *No* in each case to indicate whether the diagram has been divided into halves.

Ex. 4. Draw a ring around enough coins in each box to show a value equivalent to 10¢.

Ex. 5. Put a "wiggly" mark, as shown, on the tallest line.

Ex. 6. Match the things to be measured with the appropriate measuring instruments, drawing lines in the usual way.

Differentiations and Extensions. Use the results of this part of the test to identify children who still may be encountering some difficulty with the number abilities tested. Provide appropriate reteaching or remedial experiences.

NOTES

79

Do You Know?

1. What time is it?



— o'clock

2. Show the time.



11 o'clock

3.



Yes No Yes No



Yes No

4. Draw a ring in each box to show 10¢.



5. Put $\{$ on the tallest.

6. Match the things. Draw lines.



Pupil's Objective. To show the extent of these number abilities: (a) knowledge of the serial order and relative sizes of numbers to 100; (b) understanding of the structure of numbers to 100 in relation to the decimal nature of our system of notation; and (c) knowledge of the serial order of numbers to 20 when counting by 2's and to 100 when counting by 10's.

Background. This is the second part of the comprehensive four-page testing sequence provided at this point in the fourth period of instruction. The first part of the test sequence appears on *Book One* page 79 and the last two parts on *Book One* pages 81 and 82. You may wish to read again the Background material on Teaching *Book One* Page 79.

Book Lesson. All activities are familiar to the children. Over-view the entire test, being certain that the children understand the following things to be done:

Ex. 1. Begin at the numeral 45 and connect the dots in order to 100. Be prepared to identify the surprise picture orally.

Ex. 2. In the first two parts, write the number of tens and ones shown in the number picture, then write the corresponding numeral. In the last three parts, draw a tens-and-ones picture for each numeral (you may want all pupils to do this for 74 right away to help them remember what is to be done), then write the number of tens and ones which comprise the number.

Ex. 3. In the first column, write the numeral that comes after the given one when counting by ones. In the second column, write the numeral that comes before the given one when counting by ones. In the third column, write the numeral that comes between the two that are given.

Ex. 4. Two things are to be done with the numerals in each group: draw a ring around the smallest of the group and a double ring around the largest.

Ex. 5. Write the missing numerals when counting by 2's.

Ex. 6. Write the missing numerals when counting by 10's.

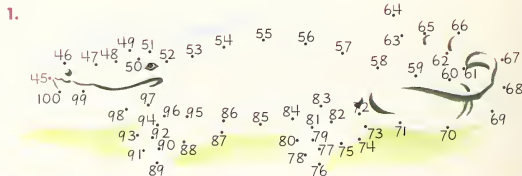
Differentiations and Extensions. Use the results of this part of the test to identify children who still may be encountering some difficulty with the number abilities tested. Provide appropriate reteaching or remedial experiences.

SPECIAL INSTRUCTIONS. In this *Teachers' Edition* (see Background on Teaching *Book One* Page 79), it has been noted that this program has built-in flexibility. Those who want to go only as far as sums and minuends through 6 with some or all of their pupils will essentially end the program with the testing on *Book One* pages 81 and 82. However, because the testing on these two pages embraces the skills with abstract addition and subtraction facts, you will probably want to give further practice before the terminating pupils take these tests. Further practice for terminating pupils on sums and minuends no larger than 6 will be found on *Book One* page 87, Ex. 2 and 3; *Book One* page 91, Ex. 2 and 3; and *Book One* page 93, Ex. 5.

With those pupils who are to continue through sums and minuends of 7, the testing on *Book One* pages 81 and 82, if taken at this time, should be considered primarily as diagnostic and may therefore be given immediately. These pupils will get much additional practice as they work through various of the exercises on the *Book One* pages which follow. Then pages 81 and 82 may be administered to these pupils again as testing pages, along with the new tests on *Book One* pages 95 and 96.

80

Do You Know?



2. Write what is missing.

$\phi \phi \phi \phi \phi \phi \parallel$	____ tens and ____ ones ____
$\phi \phi \phi \parallel \parallel \parallel \parallel$	____ tens and ____ ones ____

74	____ tens and ____ ones
56	____ tens and ____ ones
90	____ tens

3. Write the missing numbers.

4. Do you know?

67 ____	____ 47	36 ____ 38	68 29 93 78
77 ____	____ 86	97 ____ 99	42 81 57 35
50 ____	____ 71	63 ____ 65	26 64 19 80
89 ____	____ 100	58 ____ 60	72 91 82 48

5. 2 4 6 ____

6. 10 20 30 ____

Teaching Book One Page 81 (Test)

Pupil's Objective. To show the extent of these number abilities: (a) solving oral put-together and take-away problems about groups as large as 6; (b) finishing pairs of put-together and take-away stories with sums and minuends through 6; and (c) finishing whole stories with sums and minuends through 6.

Background. This is the third part of the comprehensive four-page testing sequence provided at this point in the fourth period of instruction. The first two parts of the test sequence appear on *Book One* pages 79 and 80 and the last part to come is on *Book One* page 82. (See Background on Teaching *Book One* Page 79). Be sure to read also the Special Instructions on Teaching *Book One* Page 80 before administering this part of the test.

Book Lesson

First discuss the picture with the children. Then read to them each of the following problems in turn. The pupils are to use boxes 1-6 in which to write the appropriate put-together or take-away story for the problem read. Tell the children that they can see in the picture the things you read about in the first two problems, but they can't always see the things you read about in the last four problems.

Ex. 1. Sue is using paper cups. She poured out 5 little cups of lemonade. She sold 4 of them. How many little cups of lemonade did Sue have left?

Ex. 2. Billy bought a big cup of lemonade for 3¢ and a little cup of lemonade for 2¢. How much did Billy have to pay for his lemonade?

81

Do You Know?



1.	2.	3.
4.	5.	6.

7. Finish each pair of stories.

8. Finish each pair of stories.

a. $\begin{array}{r} 3 \\ +2 \\ \hline \end{array}$	b. $\begin{array}{r} 2 \\ +4 \\ \hline \end{array}$	c. $\begin{array}{r} 5 \\ +1 \\ \hline \end{array}$
a. $\begin{array}{r} 5 \\ -3 \\ \hline \end{array}$	b. $\begin{array}{r} 6 \\ -1 \\ \hline \end{array}$	c. $\begin{array}{r} 6 \\ -4 \\ \hline \end{array}$

9. Finish each whole story.

a. $4 + 1 = \underline{\quad}$ b. $1 + 3 = \underline{\quad}$ c. $5 + 1 = \underline{\quad}$ d. $4 + 2 = \underline{\quad}$

Ex. 3. On the shelf inside the lemonade stand Sue had 2 big cups and 4 little cups. How many cups all together were on the inside shelf?

Ex. 4. Sue's mother gave her 6 lemons. Sue used 4 of the lemons to make lemonade. How many lemons did Sue have left?

Ex. 5. Sue's daddy had 6 boards. He used 5 of them to help Sue make her lemonade stand. How many boards did Sue's daddy have left?

Ex. 6. Sue sold lemonade to 5 children, then some to 1 more child. To how many children did Sue sell lemonade?

In order to test ability to handle written problems on the part of those pupils who are terminating their year's work when they have completed sums and minuends of 6, you may use at this time *Ex. 4* and *5* on *Book One* page 95.

All the remaining exercises in the test are familiar activities. Have the children complete the test independently.

Ex. 7. Finish each put-together story that is started. Then write the other put-together story that goes with it to make a pair.

Ex. 8. Finish each take-away story that is started. Then write the other take-away story that goes with it to make a pair.

Ex. 9. Finish each put-together story that is started. Then write the other put-together story and the two take-away stories that go with it to make the whole story.

Differentiations and Extensions. Use the results of this part of the test to identify children who still may be encountering some difficulty with the number abilities tested. Provide appropriate reteaching or remedial experiences.

Reminder. Remember to have your children engage in simple put-together and take-away experiences involving appropriate number combinations. The children's in-school and out-of-school activities are filled with problem-solving situations of the simple put-together and take-away variety. See that you utilize such things to the fullest advantage in developing the children's problem-solving abilities.

NOTES

Pupil's Objective. To show ability to complete put-together and take-away facts stated in abstract form, both horizontally and vertically.

Background. This is the final part of the comprehensive four-page testing sequence provided at this point in the fourth period of instruction. The first three parts of the test sequence appear on *Book One* pages 79, 80, and 81. (See Background on Teaching Book One Page 79.) Be sure to read also the Special Instructions on Teaching Book One Page 80 before administering this part of the test.

Book Lesson

Ex. 1-2. Have the children work independently on this page with a minimum of direction. Observe the pupils carefully as they work, taking note of the levels of attack used by various children—particularly those who must resort to lower-level procedures, such as counting on their fingers, using dot pictures, etc. You don't want definitely to forbid the use of such procedures because pupils will then find some they can use secretly. You should, however, constantly encourage pupils to adopt higher levels of procedure.

Differentiations and Extensions

1. Have all pupils play these games: *Moving Man*; *Postman* (2). (See *Teachers' Edition* pages 19 and 23.)

2. Use the results of this part of the test to identify children who still may be encountering some difficulty with the number abilities tested. Provide appropriate reteaching or remedial experiences.

3. Check to see that you have completed each child's Progress Chart, as described on *Teachers' Edition* page 251. You may wish to pass the Progress Charts along to the next year's teacher so that she will have this valuable appraisal at hand at the beginning of the next year.

LOOKING AHEAD

For those pupils who are terminating the year's work at this time (after the study and testing of the addition and subtraction facts with sums and minuends of 6), you will want to use the Looking-Ahead activities appearing on Teaching Book One Page 91 and Teaching Book One Page 94. These pupils will then gain some insight into the work to be taught later in the program in connection with fourths and one fourth, and with the quarter.

82

Do You Know?

1. Finish the stories.

$2 + 2 = \underline{\quad}$	$1 + 5 = \underline{\quad}$	$\begin{array}{r} 4 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 1 \\ \hline \end{array}$
$2 + 4 = \underline{\quad}$	$3 + 2 = \underline{\quad}$				
$2 + 1 = \underline{\quad}$	$1 + 1 = \underline{\quad}$				
$5 - 3 = \underline{\quad}$	$6 - 3 = \underline{\quad}$	$\begin{array}{r} 6 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ - 1 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 1 \\ \hline \end{array}$
$6 - 2 = \underline{\quad}$	$2 - 1 = \underline{\quad}$				
$3 - 1 = \underline{\quad}$	$5 - 2 = \underline{\quad}$				

2. Write the answers.

$\begin{array}{r} 3 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 1 \\ + 2 \\ \hline \end{array}$
$\begin{array}{r} 5 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ - 1 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 3 \\ + 1 \\ \hline \end{array}$

$4 + 1 = \underline{\quad}$	$4 - 2 = \underline{\quad}$	$1 + 1 + 1 = \underline{\quad}$
$4 - 3 = \underline{\quad}$	$4 + 2 = \underline{\quad}$	$1 + 1 + 3 = \underline{\quad}$
$5 - 1 = \underline{\quad}$	$2 + 3 = \underline{\quad}$	$2 + 1 + 2 = \underline{\quad}$
$5 + 1 = \underline{\quad}$	$6 - 1 = \underline{\quad}$	$1 + 2 + 1 = \underline{\quad}$
$3 + 3 = \underline{\quad}$	$6 - 4 = \underline{\quad}$	$2 + 2 + 1 = \underline{\quad}$

$\begin{array}{r} 8 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 1 \\ \hline \end{array}$	$9 + 1 = \underline{\quad}$	$\begin{array}{r} 9 \\ - 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 1 \\ \hline \end{array}$	$10 - 1 = \underline{\quad}$
		$7 + 1 = \underline{\quad}$			$8 - 1 = \underline{\quad}$

Pupil's Objective. To discover and write in two ways the parts of the group of 7.

New Word: *flowers*

Background. This is the beginning of the optional section of the fourth period of instruction, which deals with component parts of 7 and the addition and subtraction facts with sums and minuends of 7. The basic instructional work involving facts with sums and minuends of 7 is limited in the pupil's book to pictured groups of real and representative objects. However, at several points in the lessons that follow, you will find suggested abstract practice that you may use with the *more capable children*.

Teacher's Preparation. Have available enough buttons or other similar representative items so that as children work in pairs, as suggested in the Pre-book Lesson, each pair may have a group of 7 buttons to experiment with.

Pre-book Lesson

In so far as possible, have children work in pairs, each pair having 7 buttons. Have one child of each pair find two parts of 7 and the other verify. If they can, have them record the findings in a pair of frames as $\begin{array}{|c|c|} \hline 7 & 4 \text{ and } 3 \\ \hline \end{array}$ and $\begin{array}{|c|c|} \hline 7 & 3 \text{ and } 4 \\ \hline \end{array}$

Book Lesson

Ex. 1. Have the children identify and record the number of flowers in the whole group, the number that are yellow, and the number that are red. Then have the children complete each

83

Parts of 7



How many flowers are in the whole group? ____

____ flowers are yellow.

____ flowers are red.

$\begin{array}{|c|c|} \hline 7 & 4 \text{ and } \\ \hline \end{array}$

$\begin{array}{|c|c|} \hline 7 & 3 \text{ and } \\ \hline \end{array}$



____ in all

____ are little.

____ is big.

$\begin{array}{|c|c|} \hline 7 & 6 \text{ and } \\ \hline \end{array}$

$\begin{array}{|c|c|} \hline 7 & 1 \text{ and } \\ \hline \end{array}$



____ in all

____ are little.

____ are big.

$\begin{array}{|c|c|} \hline 7 & 5 \text{ and } \\ \hline \end{array}$

$\begin{array}{|c|c|} \hline 7 & 2 \text{ and } \\ \hline \end{array}$



____ in all

____ and

____ and

____ in all

____ and

____ and

____ in all

____ and

____ and

story about 7 and its parts, 4 and 3. Then have pupils read the two stories aloud, using the terminology "7 has the parts, 4 and 3" and "7 has the parts, 3 and 4."

Ex. 2-3. Have the children work these exercises independently.

Ex. 4. Work together with the children on Ex. 4. First, have them identify and record the size of the whole group. Then have them identify the size of each of the two parts, but not record the parts as before. Finally, help the children to write the pair of stories about 7 and its parts, 1 and 6.

Ex. 5-6. Have the children work independently on these two exercises, which follow the same pattern of procedure as Ex. 4.

Differentiations and Extensions

1. *Slower learners* may need further experience with work in Ex. 4-6. Provide individual practice sheets with work similar in nature to that in these three exercises but with the groupings shown in simple representative form (dots or the like). Use standard patterns for the groupings wherever applicable. The following groupings for parts of 7 may be used for this practice material: 6 and 1, 5 and 2, 4 and 3, 3 and 4, 2 and 5, and 1 and 6.

2. Pupils will be helped if they summarize their learnings about the parts of 7 in an organized way. If the charts made in connection with the study of *Book One* page 43 have been saved, pupils can include now the parts of 7. If pupils must begin again, they can make a chart for 7 and its parts, similar to *Book One*, page 24.

3. Have the *more capable children* finish the following parts stories in abstract form, without reference to representative materials, in so far as possible.

$\begin{array}{ c c } \hline 7 & 5 \text{ and } \\ \hline \end{array}$	$\begin{array}{ c c } \hline 7 & 3 \text{ and } \\ \hline \end{array}$
$\begin{array}{ c c } \hline 7 & 4 \text{ and } \\ \hline \end{array}$	$\begin{array}{ c c } \hline 7 & 6 \text{ and } \\ \hline \end{array}$
$\begin{array}{ c c } \hline 7 & 1 \text{ and } \\ \hline \end{array}$	$\begin{array}{ c c } \hline 7 & 2 \text{ and } \\ \hline \end{array}$

4. Have *all pupils* engage in appropriate number games (see *Teachers' Edition* pages 15-25). Selections may be made from the following: *Climb the Ladder* (3); *Fish* (3); *Guess Again* (4); *The Wizard* (7).

LOOKING AHEAD

You may wish to have your *more capable children* explore the component parts of groups larger than 7 but not exceeding 10. For example, have these children show a group such as 8 concretely, using suitable counters or markers. Then have the children rearrange the 8-group to show two of its component parts, such as 5 and 3. Then have them tell two stories about 8 and its parts, 5 and 3. ("Five and three are parts of eight; three and five are parts of eight.") Have the children discover and tell all the stories about 8 and its parts. In the case of 4 and 4, of course there is only one story to be told about 8 and its parts.

NOTES

Pupil's Objective. To learn about the pair of put-together stories about $6 + 1$ and $1 + 6$.

New Word: *bug*

Background. *Book One* page 84 is the first of a three-page sequence in which the following pairs of put-together stories are studied in turn:

$$\begin{array}{lll} 6 + 1 = 7 & 5 + 2 = 7 & 4 + 3 = 7 \\ 1 + 6 = 7 & 2 + 5 = 7 & 3 + 4 = 7 \end{array}$$

The work of this page sets the pattern of procedure for the work of the two following pages.

Pre-book Lesson. Have the children show 6 and 1 as parts of 7, using some representative materials such as buttons. After each child has formed his component parts, ask, **Who can tell me one put-together story about the two parts, 6 and 1?** (Help the pupils to remember that they say "Six and one are seven.") Then ask, **Now who can tell me the other put-together story about the two parts, 6 and 1?** (1 and 6 are 7.) Finally ask, **Who can tell me the pair of put-together stories about the two parts, 6 and 1?**

Book Lesson

Ex. 1. Have the children look at the picture of the birds, identify and record the number of little birds and then the number of big birds. Then have the children complete the following two put-together stories:

$$\begin{array}{l} 6 \text{ little birds} + 1 \text{ big bird} = \underline{\hspace{1cm}} \text{ birds} \\ 1 \text{ big bird} + 6 \text{ little birds} = \underline{\hspace{1cm}} \text{ birds} \end{array}$$

Have the children read aloud the completed stories. Emphasize that these two stories make a *pair* of put-together stories. Then have the children complete the pair of stories in abstract form on the last line of Ex. 1.

Ex. 2. Let the children try to work Ex. 2 independently.

Ex. 3. Have the children identify and record the number of worms. (1) Have the children draw 6 more simple worms to the right of the one shown, but separated sufficiently from it to stand out as a separate group. Then have the children tell the two put-together stories about the worms and then write each of the two stories in abstract form in the spaces provided. Emphasize that the pupils are writing a *pair* of put-together stories.

Ex. 4. Have the pupils work Ex. 4 independently.

Ex. 5. Give special attention to the statement in Ex. 5. Be certain that the children understand how the order of the addends may be reversed without affecting the sum. It is easier for children to add the 1 to the 6, so $6 + 1 = 7$ is the fact most likely to be used as the helper.

Differentiations and Extensions. See the suggestions included under Differentiations and Extensions on Teaching Book One Page 86.

Reminders

1. Remember to provide experiences dealing with various abilities associated with the numbers to 100, such as:

- rote and rational counting
- serial order of numerals
- reading and writing numerals
- tens-and-ones structure of numbers
- relative sizes of numbers

Take advantage of opportunities that arise in connection with in-school and out-of-school activities.

2. Remember also to provide appropriate rote and rational counting experiences in counting by 2's to 20, by 5's to 50, and by 10's to 100.

NOTES

84

Pairs of Put-Together Stories about $6 + 1$ and $1 + 6$

1.



_____ little birds. _____ big bird.

Finish the put-together stories.

$$6 \text{ little birds} + 1 \text{ big bird} = \underline{\hspace{1cm}} \text{ birds}$$

$$1 \text{ big bird} + 6 \text{ little birds} = \underline{\hspace{1cm}} \text{ birds}$$

$$6 + 1 = \underline{\hspace{1cm}} \quad 1 + 6 = \underline{\hspace{1cm}}$$

2.

_____ little bug. _____ big bugs.

Finish the put-together stories.

$$1 \text{ little bug} + 6 \text{ big bugs} = \underline{\hspace{1cm}} \text{ bugs}$$

$$6 \text{ big bugs} + 1 \text{ little bug} = \underline{\hspace{1cm}} \text{ bugs}$$

$$1 + 6 = \underline{\hspace{1cm}} \quad 6 + 1 = \underline{\hspace{1cm}}$$



3.

How many are here? _____ Draw 6.



Write the put-together stories.

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

4.

How many are here? _____ Draw 1.



Write the put-together stories.

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

5. Pairs of stories help. $6 + 1 = 7$ helps you know $\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = 7$.

Pupil's Objective. To learn about the pair of put-together stories about $5 + 2$ and $2 + 5$.

New Word: *swings*

Pre-book Lesson. Have the children show 5 and 2 as parts of 7, using some representative materials such as buttons. After each child has formed his component parts, ask, **Who can tell me one put-together story about the two parts, 5 and 2?** (Help the pupils to remember that they say "Five and two are seven.") Then ask, **Now who can tell me the other put-together story about the two parts, 5 and 2?** (2 and 5 are 7.) Finally, ask, **Who can tell me the pair of put-together stories about the two parts, 5 and 2?**

Book Lesson

Ex. 1. Have the children look at the picture of the birds, identify and record the number of red birds and then the number of blue birds. Then have the children complete the following two put-together stories in abstract form:

$$\begin{aligned} 5 + 2 &= 7 \\ 2 + 5 &= 7 \end{aligned}$$

Have the children read aloud the completed stories. Emphasize that these two stories make a *pair* of put-together stories.

Ex. 2. Let the children try to work Ex. 2 independently.

Ex. 3. Have the children identify and record the number of swings. (5) Have the children draw 2 more simple swings to the right of the five shown, but separated sufficiently from them

to stand out as a separate group. Then have the children tell the two put-together stories about the swings and write each of the two stories in abstract form in the spaces provided. Emphasize that the pupils are writing a *pair* of put-together stories.

Ex. 4. Have the pupils work Ex. 4 independently.

Ex. 5. Give special attention to the statements in Ex. 5. Be certain that the children understand how the order of the addends may be reversed without affecting the sum. It is easier for children to add the 2 to the 5, so $5 + 2 = 7$ is the fact most likely to be used as the helper.

Differentiations and Extensions. See the suggestions included under Differentiations and Extensions on Teaching Book One Page 86.

NOTES

85

Pairs of Put-Together Stories about $5 + 2$ and $2 + 5$

1.



— birds are red.

— birds are blue.

The pair of put-together stories is

$$5 + \underline{\quad} = \underline{\quad}$$

$$2 + \underline{\quad} = \underline{\quad}$$

2. — birds are on swings.

— birds are not on swings.

The pair of put-together stories is

$$2 + \underline{\quad} = \underline{\quad}$$

$$5 + \underline{\quad} = \underline{\quad}$$



3. How many are here? —

Draw 2.



Write the put-together stories.

$$\cdot \quad \underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

4. How many are here? —

Draw 5.



Write the put-together stories.

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

5. Pairs of stories help. $5 + 2 = 7$ helps you know $\underline{\quad} + \underline{\quad} = 7$.

Pupil's Objective. To learn about the pair of put-together stories about $4 + 3$ and $3 + 4$.

NOTES

New Words: *eating, nest*

Pre-book Lesson. Have the children show 4 and 3 as parts of 7, using some representative materials such as buttons. After each child has formed his component parts, ask, **Who can tell me one put-together story about the two parts, 4 and 3?** (Help the pupils to remember that they say "Four and three are seven.") Then ask, **Now who can tell me the other put-together story about the two parts, 4 and 3?** (3 and 4 are 7.) Finally, ask, **Who can tell me the pair of put-together stories about the two parts, 4 and 3?**

Book Lesson

Ex. 1. Have the children look at the picture of the birds, identify and record the number not eating and then the number eating. Then have the children complete the following two put-together stories in abstract form:

$$4 + 3 = 7$$

$$3 + 4 = 7$$

Have the children read aloud the completed stories. Emphasize that these two stories make a *pair* of put-together stories.

Ex. 2. Let the children try to work Ex. 2 independently.

Ex. 3. Have the children identify and record the number of apples. (4) Have the children draw 3 more simple apples to the right of those shown, but separated sufficiently from them to stand out as a separate group. Then have the children tell the two put-together stories about the apples and write each of the two stories in abstract form in the spaces provided. Emphasize that the pupils are writing a *pair* of put-together stories.

Ex. 4. Have the pupils work Ex. 4 independently.

Ex. 5. Give special attention to the statements in Ex. 5. Be certain that the children understand how the order of the addends may be reversed without affecting the sum. It is easier for children to add the 3 to the 4, so $4 + 3 = 7$ is the fact most likely to be used as the helper.

Differentiations and Extensions

1. For *slower learners* show, with representative materials, each of the groupings listed below. Then have the children tell orally the pair of put-together stories for each grouping and also write on the chalkboard the pair of stories in abstract form. Use the following groupings: 5 and 2, 3 and 4, 6 and 1, 2 and 5, 4 and 3, and 1 and 6.

2. For *all children*, duplicate work sheets with material like that shown in Ex. 3 and 4 but use triangles or squares in patterns. For the part of 7 given, use in turn 1, 2, 3, 4, 5, and 6.

3. Have the *more capable children* complete the following pairs of put-together stories in abstract form:

$$4 + 3 = \underline{\quad} \quad 2 + 5 = \underline{\quad} \quad 6 + 1 = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad} \quad \underline{\quad} + \underline{\quad} = \underline{\quad} \quad \underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$5 + 2 = \underline{\quad} \quad 1 + 6 = \underline{\quad} \quad 3 + 4 = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad} \quad \underline{\quad} + \underline{\quad} = \underline{\quad} \quad \underline{\quad} + \underline{\quad} = \underline{\quad}$$

86

Pairs of Put-Together Stories about $4 + 3$ and $3 + 4$



1.

_____ birds are not eating.

_____ birds are eating.

The pair of put-together stories is

$$4 + \underline{\quad} = \underline{\quad}$$

$$3 + \underline{\quad} = \underline{\quad}$$

2. _____ birds are on nests.

_____ birds are not on nests.

The pair of put-together stories is

$$3 + \underline{\quad} = \underline{\quad}$$

$$4 + \underline{\quad} = \underline{\quad}$$



3. How many are here? _____ Draw 3.



Write the put-together stories.

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

4. How many are here? _____ Draw 4.



Write the put-together stories.

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

5. Pairs of stories help. $4 + 3 = 7$ helps you know $\underline{\quad} + \underline{\quad} = 7$.

Pupil's Objectives: (a) To derive and write pairs of put-together stories with sums of 7 from semi-concrete representations; and (b) to maintain selected number abilities developed previously.

New Word: *caught*

Book Lesson

Ex. 1. Use Ex. 1a for illustrative purposes. Have the children identify orally the number in each group and the number all together. Then have them write the pair of put-together stories in abstract form. Permit the children to work independently on Ex. 1b-1f.

Ex. 2-3. Have the children work independently on this mixed practice with recall of answers for the addition and subtraction facts with sums and minuends through 6, in both horizontal and vertical form.

Ex. 4. First, have each problem read by a child to the entire group, making sure that all children have no word recognition difficulties in any problem. Then, have the children read each problem silently and write the corresponding put-together or take-away story. Allow use of representative materials or diagrams if necessary. Circulate among the children as they work to see the level of procedure utilized by each.

Differentiations and Extensions

1. For *slower learners*, provide the kind of experience that is appropriate to the type of difficulty encountered.

a. Further practice work with sums of 7, similar to Ex. 1, can be provided easily if needed.

b. If added practice is needed with the work in Ex. 2-3, have *slower learners* work in pairs with *more capable children*, using individual fact cards for abstract practice with sums through 6.*

c. Assist children who may have difficulty in differentiating between addition and subtraction problems such as those in Ex. 4. Help pupils to represent the conditions of each problem and then "act out" what must be done to answer the question. Always be certain that this dramatizing focuses on the putting together of groups or the separating of a group into two parts.

2. For *all children*, provide maintenance work with the whole story as well as with recall of addition and subtraction facts by making use of exercises such as the following:

$$\begin{array}{r} 4 + 2 = \underline{\quad} \\ \underline{\quad} + \underline{\quad} = \underline{\quad} \\ \underline{\quad} - \underline{\quad} = \underline{\quad} \\ \underline{\quad} - \underline{\quad} = \underline{\quad} \end{array} \qquad \begin{array}{r} 1 \\ + 4 + \underline{\quad} = \underline{\quad} \end{array}$$

Restrict such work to sums and minuends not exceeding 6.

3. Also, for *all children*, make up additional written problems, using vocabulary and situations familiar to the children. Provide mixed addition and subtraction problems with sums and minuends not exceeding 6.

4. If you want the *more capable children* to move into work with abstract addition facts having sums of 7, provide practice with exercises similar to the following in which some of the facts have the sum 7:

$$\begin{array}{r} 4 + 2 = \underline{\quad} \\ 6 + 1 = \underline{\quad} \\ 2 + 3 = \underline{\quad} \\ 3 + 4 = \underline{\quad} \end{array} \qquad \begin{array}{r} 3 \quad 5 \quad 1 \quad 4 \\ + 3 \quad + 2 \quad + 6 \quad + 1 \end{array}$$

LOOKING AHEAD


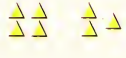




You may wish to have your *more capable children* extend their exploratory put-together experiences (manipulative and oral) to groups larger than 7 but not exceeding 10. For example, have these children show concretely a total group of 8 using suitable counters or markers as two distinct sub-groups (for example, 6 and 2). Then have the children tell a pair (except in the case of 4 and 4) of put-together stories about the two groups ("Six and two are eight," and "Two and six are eight"). Have the children discover and tell all the put-together stories that have a sum of 8.

*For those who wish them, *Number Cards* may be purchased from the publisher, Ginn and Company. Some of these cards permit practice on the facts from representative pictures. (See *Teachers' Edition* page 9.)

NOTES

Do You Know These Stories?

1. Write the pairs of put-together stories.

<p>a. </p> <p>___ + ___ = ___</p>	<p>b. </p> <p>___ + ___ = ___</p>	<p>c. </p> <p>___ + ___ = ___</p>
<p>d. </p> <p>___ + ___ = ___</p>	<p>e. </p> <p>___ + ___ = ___</p>	<p>f. </p> <p>___ + ___ = ___</p>

2. Write the answers.

$$\begin{array}{r} 5 - 1 = \underline{\quad} \\ 2 + 4 = \underline{\quad} \end{array} \qquad \begin{array}{r} 3 + 3 = \underline{\quad} \\ 2 - 1 = \underline{\quad} \end{array}$$

3. Write the answers.

$$\begin{array}{r} 6 \quad 5 \quad 4 \quad 5 \\ - 3 \quad + 1 \quad + 2 \quad - 3 \end{array}$$

4. Finish the stories.

- | | |
|--|--|
| a. Tom caught 3 fish and Jack caught 2 fish. Find how many fish they caught all together. | b. We saw 3 fish in the water. Then we saw 3 more fish. Find how many we saw in the water. |
| ___ fish + ___ fish = ___ fish | ___ fish + ___ fish = ___ fish |
| c. Susan has 6 cents in a box. She takes out 2 cents. Find how many cents are left in the box. | d. Father has 5 cents. He puts 4 cents in Tom's hat. Find how many cents Father has then. |
| ___ cents - ___ cents = ___ cents | ___ cents - ___ cents = ___ cent |

Pupil's Objective. To learn about the pair of take-away stories about $7 - 1$ and $7 - 6$.

Background. *Book One* page 88 is the first of a three-page sequence in which the following pairs of take-away stories are studied in turn:

$$\begin{array}{lll} 7 - 1 = 6 & 7 - 2 = 5 & 7 - 3 = 4 \\ 7 - 6 = 1 & 7 - 5 = 2 & 7 - 4 = 3 \end{array}$$

The work on this page sets the pattern of procedure for the work of the two following pages as well.

Pre-book Lesson. Have the children show a group of 7, using some representative materials such as buttons. After each child has represented a group of 7, say: **Cover 1. Tell me the take-away story about 7 take away 1.** (Remind pupils to say, "Seven take away one is six.") **Now cover 6. Tell me the take-away story about 7 take away 6.** (7 take away 6 is 1.) **Who can tell me a pair of take-away stories about 7 and the parts, 1 and 6?** (7 take away 1 is 6; 7 take away 6 is 1.)

Book Lesson

Ex. 1. Have the children look at the picture of the Indians, and identify and record the number of Indians they see in all. Next, have the children cover 1 Indian, identify and record the number of Indians left, and then write the take-away story in abstract form. Next, have the children cover 6 Indians, identify and record the number of Indians left, and then write the take-away story in abstract form. Finally, have the children complete the two take-away stories as a *pair*.

Ex. 2-3. If possible, let the children work independently on these exercises. In each case the child is first to identify and record the number of things in the whole group. Then he is to cover the indicated part of the group, identify how many are left, and finish the take-away story in abstract form. After the two take-away stories have been written in each exercise, emphasize that they make a *pair* of take-away stories.

Ex. 4. Give special attention to the statement in *Ex. 4*, being certain that the children understand how the fact $7 - 1 = 6$ helps them to know that $7 - 6 = 1$.

Differentiations and Extensions. See the suggestions included under Differentiations and Extensions on Teaching *Book One* page 90.

NOTES

88

Pairs of Take-Away Stories about $7 - 1$ and $7 - 6$

1.



— Indians in all

Cover 1 Indian. — Indians are left. $7 - \underline{\quad} = \underline{\quad}$ Cover 6 Indians. — Indian is left. $7 - \underline{\quad} = \underline{\quad}$ The pair of take-away stories is $7 - 1 = \underline{\quad}$ $7 - 6 = \underline{\quad}$

2.



— in all

Cover 6. $7 - \underline{\quad} = \underline{\quad}$ Cover 1. $7 - \underline{\quad} = \underline{\quad}$

3.



— in all

Cover 1. $7 - \underline{\quad} = \underline{\quad}$ Cover 6. $7 - \underline{\quad} = \underline{\quad}$ 4. Pairs of stories help. $7 - 1 = 6$ helps you know $7 - \underline{\quad} = \underline{\quad}$

Pupil's Objective. To learn about the pair of take-away stories about $7 - 2$ and $7 - 5$.

New Word: canoes

Pre-book Lesson. Have the children show a group of 7, using representative materials such as buttons. After each child has represented a group of 7, say: **Cover 2. Tell me the take-away story about 7 take away 2.** (Remind pupils to say, "Seven take away two is five.") **Now cover 5. Tell me the take-away story about 7 take away 5.** (7 take away 5 is 2.) **Who can tell me a pair of take-away stories about 7 and its parts, 2 and 5?** (7 take away 2 is 5; 7 take away 5 is 2.)

Book Lesson

Ex. 1. Have the children look at the picture of the canoes. Have the children identify and record the number of canoes in all. Next, have the children cover 2 canoes, identify and record the number of canoes left, and then write the take-away story in abstract form. Next, have the children cover 5 canoes, identify and record the number of canoes left, and then write the take-away story in abstract form. Finally, have the children write the two take-away stories as a pair.

Ex. 2-3. If possible, let the children work independently on these exercises. In each case the child is first to identify and record the number of things in the whole group. Then, he is to cover the indicated part of the group and finish the take-away story in abstract form. After the two take-away stories have been

written in each exercise, emphasize that they make a pair of take-away stories.

Ex. 4. Give special attention to the statement in Ex. 4, being certain that the children understand how the fact $7 - 2 = 5$ helps them to know that $7 - 5 = 2$.

Differentiations and Extensions. See the suggestions included under Differentiations and Extensions on Teaching Book One Page 90.

NOTES

89

Pairs of Take-Away Stories about $7 - 2$ and $7 - 5$

1.



___ canoes in all

Cover 2 canoes. ___ canoes are left. $7 - \underline{\quad} = \underline{\quad}$

Cover 5 canoes. ___ canoes are left. $7 - \underline{\quad} = \underline{\quad}$

The pair of stories is ___ - ___ = ___ ___ - ___ = ___

2.



___ in all

Cover 5. $7 - \underline{\quad} = \underline{\quad}$ Cover 2. $7 - \underline{\quad} = \underline{\quad}$

The pair of stories is ___ - ___ = ___ ___ - ___ = ___

3.



___ in all

Cover 2. $7 - \underline{\quad} = \underline{\quad}$ Cover 5. $7 - \underline{\quad} = \underline{\quad}$

The pair of stories is ___ - ___ = ___ ___ - ___ = ___

4. Pairs of stories help. $7 - 2 = 5$ helps you know $7 - \underline{\quad} = \underline{\quad}$



Pupil's Objective. To learn about the pair of take-away stories about $7 - 3$ and $7 - 4$.

New Word: *tepees*

Pre-book Lesson. Have the children show a group of 7, using some representative materials such as buttons. After each child has represented a group of 7, say: **Cover 3. Tell me the take-away story about 7 take away 3.** (Remind pupils to say, "Seven take away three is four.") **Now cover 4. Tell me the take-away story about 7 take away 4.** (7 take away 4 is 3.) **Who can tell me a pair of take-away stories about 7 and its parts, 3 and 4?** (7 take away 3 is 4; 7 take away 4 is 3.)

Book Lesson

Ex. 1. Have the children look at the picture of the tepees. Have the children identify and record the number of tepees in all. Next, have the children cover 3 tepees, identify and record the number of tepees left, and then write the take-away story in abstract form. Next, have the children cover 4 tepees, identify and record the number of tepees left, and then write the take-away story in abstract form. Finally, have the children complete the two take-away stories as a pair.

Ex. 2-3. If possible, let the children work independently on these exercises. In each case the child is first to identify and record the number of things in the whole group. Then, he is to cover the indicated part of the group and finish the take-away story in abstract form. After the two take-away stories have been written in each exercise, emphasize that they make a pair of take-away stories.

Ex. 4. Give special attention to the statement in Ex. 4, being certain that the children understand how the fact $7 - 3 = 4$ helps them to know that $7 - 4 = 3$.

Differentiations and Extensions

1. For *slower learners*, work with representative materials in the following manner: First, show two groups of 7. Then, in one group, cover 2 of the 7 and have the children tell the take-away story. While keeping the 2 of that group covered, cover 5 of the other 7-group and have the children tell the take-away story. Then, have the children tell both stories to make a pair. Follow a similar procedure with the following groupings:

- Cover 6 of one group and 1 of the other group.
- Cover 3 of one group and 4 of the other group.
- Cover 1 of one group and 6 of the other group.
- Cover 5 of one group and 2 of the other group.
- Cover 4 of one group and 3 of the other group.

2. For *all pupils*, duplicate work sheets with six exercises showing each time the pattern for 7 in dots (or squares). In the several copies of the pattern, show part of the 7 dots colored—in turn 1 dot, 2 dots, 3 dots, 4 dots, 5 dots, 6 dots—with the other dots black. Beside each pattern show the blanks for the pair of take-away stories to be written when the pupil covers first the black dots and then the color dots.

3. Have the *more capable children* complete the following pairs of take-away stories in abstract form:

$$7 - 5 = \underline{\quad} \quad 7 - 1 = \underline{\quad} \quad 7 - 4 = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad} \quad \underline{\quad} - \underline{\quad} = \underline{\quad} \quad \underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$7 - 6 = \underline{\quad} \quad 7 - 3 = \underline{\quad} \quad 7 - 2 = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad} \quad \underline{\quad} - \underline{\quad} = \underline{\quad} \quad \underline{\quad} - \underline{\quad} = \underline{\quad}$$

LOOKING AHEAD

You may wish to have the *more capable children* extend further their manipulative and oral exploratory take-away experiences involving groups larger than 7 but not exceeding 10. For example, have these children show concretely a total group of 8, using suitable counters or markers. Have these children cover a part of the group (for example, 3) and tell the take-away story ("Eight take away three is five."). Then have the children cover the other part of the group (5) and tell the related take-away story ("Eight take away five is three."). In a similar way (except in the case of $8 - 4$, where there is no pair of stories), have the children discover and tell all the stories about taking away from 8.

NOTES

90

Pairs of Take-Away Stories about $7 - 3$ and $7 - 4$



___ tepees in all

Cover 3 tepees. ___ tepees are left. $7 - \underline{\quad} = \underline{\quad}$

Cover 4 tepees. ___ tepees are left. $7 - \underline{\quad} = \underline{\quad}$

The pair of stories is $\underline{\quad} - \underline{\quad} = \underline{\quad}$ $\underline{\quad} - \underline{\quad} = \underline{\quad}$



___ in all

Cover 4. $7 - \underline{\quad} = \underline{\quad}$

Cover 3. $7 - \underline{\quad} = \underline{\quad}$

The pair of stories is $\underline{\quad} - \underline{\quad} = \underline{\quad}$ $\underline{\quad} - \underline{\quad} = \underline{\quad}$



___ in all

Cover 3. $7 - \underline{\quad} = \underline{\quad}$

Cover 4. $7 - \underline{\quad} = \underline{\quad}$

The pair of stories is $\underline{\quad} - \underline{\quad} = \underline{\quad}$ $\underline{\quad} - \underline{\quad} = \underline{\quad}$

4. Pairs of stories help. $7 - 3 = 4$ helps you know $7 - \underline{\quad} = \underline{\quad}$

Pupil's Objectives: (a) To derive and write pairs of take-away stories with minuends of 7 from semi-concrete representations; and (b) to maintain selected number abilities developed previously.

Book Lesson

Ex. 1. Use Ex. 1a for illustrative purposes. The children are to do the following things: (1) identify the number in the total group (without recording it); (2) cover a specified part of the group and write the take-away story; (3) cover the second specified part of the group and write the other take-away story to make the pair for the parts involved.

Ex. 2. Have the children finish the work to make a pair of stories in each case.

Ex. 3. Have the children recall and write the answers in each case.

Ex. 4. Give the following two problems to the children orally. Have them write the number story in the space provided.

a. Billy had 6 balloons. Then 2 of them blew away in the wind. How many balloons did Billy have left?

b. Sue had only 1 dress for her doll. Mother made 5 more dresses for Sue's doll. How many doll dresses did Sue then have all together?


Differentiations and Extensions

1. For *slower learners*, provide the kind of experience appropriate to the type of difficulty encountered.

91


Do You Know These Stories?

1. Write the pair of stories for each box.

a. 


Cover 1.

Cover 6.

b. 

Cover 4.

Cover 3.

c. 

Cover 5.

Cover 2.

2. Finish the work to make pairs.

a. $5 + 1 = \underline{\quad}$ b. $2 + 4 = \underline{\quad}$ c. $6 - 5 = \underline{\quad}$ d. $6 - 2 = \underline{\quad}$

3. Write the answers.

$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ - 1 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ - 1 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 2 \\ \hline \end{array}$

$4 + 2 = \underline{\quad}$ $5 - 2 = \underline{\quad}$ $1 + 4 = \underline{\quad}$ $6 - 1 = \underline{\quad}$
 $5 - 4 = \underline{\quad}$ $1 + 5 = \underline{\quad}$ $6 - 4 = \underline{\quad}$ $2 + 3 = \underline{\quad}$

4. Write your work in the boxes.

a.	b.
----	----

a. Further work with minuends of 7 similar to that in Ex. 1 can be provided easily if needed.

b. If added practice is needed with the work in Ex. 2-3, have *slower learners* work in pairs with *more capable children*, using individual fact cards for abstract practice with minuends through 6.*

c. Assist children who may have difficulty with the oral problems by having them represent each situation with manipulative materials and then dramatize what must be done to answer the question asked. Stress the ideas of separating and of combining.

2. For *all pupils*, provide maintenance work with the whole-story idea, but now with a subtraction fact, rather than an addition fact, used first. Two illustrations follow:

$5 - 2 = \underline{\quad}$	$6 - 2 = \underline{\quad}$
$\begin{array}{r} 5 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 2 \\ \hline \end{array}$
$\begin{array}{r} 5 \\ + \underline{\quad} \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + \underline{\quad} \\ \hline \end{array}$

Restrict such work to sums and minuends no larger than 6.

3. Also, for *all pupils*, make up additional oral problems. Provide mixed addition and subtraction problems with sums and minuends not exceeding 6.

4. If you want the *more capable children* to do some work with abstract subtraction facts having minuends of 7, provide practice similar to the following in which some facts have the minuend 7:

$6 - 4 = \underline{\quad}$	$7 - 2 = \underline{\quad}$	$7 - 6 = \underline{\quad}$
$7 - 2 = \underline{\quad}$	$7 - 3 = \underline{\quad}$	$7 - 4 = \underline{\quad}$
$5 - 3 = \underline{\quad}$	$7 - 3 = \underline{\quad}$	$7 - 1 = \underline{\quad}$
$7 - 4 = \underline{\quad}$	$7 - 3 = \underline{\quad}$	$7 - 5 = \underline{\quad}$
$7 - 6 = \underline{\quad}$	$7 - 3 = \underline{\quad}$	$7 - 2 = \underline{\quad}$

LOOKING AHEAD

The suggestions below provide oral manipulative experiences in looking ahead to later written experiences with fourths and one fourth of an object.

1. As the pupils watch you, cut a paper plate into two equal parts. Have the children recall that the plate has been cut into halves—into two equal parts—and that each equal part is called *one half*.

2. Then, with the halves placed together to form the whole, cut the plate along a line perpendicular to the initial cut in such a way that the plate then will be cut into four equal parts. Let the children identify the number of parts (4), and have them verify the equality of the parts by superimposing. Solicit a statement from the children or, if necessary, tell them that the plate now has been cut into fourths (4 equal parts) and that each equal part is called *one fourth*.

3. Cut other appropriate objects into 4 equal parts, as above. In each instance emphasize the following things:

- each object has been cut into 4 parts;
- the four parts are all *equal*; that is, all are the same size;
- the object has been cut into *fourths*;
- each equal part is called *one fourth*.

4. Cut some objects into 4 unequal parts and emphasize that such objects have *not* been cut into fourths and that each part is *not* one fourth. Also, cut some objects into three parts, two parts, and so on, and ask why these parts are not fourths.

*For those who wish them, *Number Cards* may be purchased from the publisher, Ginn and Company. Some of these cards permit practice on the facts from representative pictures. (See *Teachers' Edition* page 9.)



Pupil's Objective. To learn to write whole stories involving groups of 7 from pictures of representative items.

NOTES

Background. This is the first of a two-page sequence in which the whole-story idea is extended to the 7-group. On *Book One* page 92, note particularly the emphasis upon component parts as the basis for deriving whole stories.

Pre-book Lesson

1. Supply each child with 7 counters of a suitable type. First, ask the children to show the group of 7 as 5 and 2. Then, solicit four stories—two put-together and two take-away—about 7 and its parts, 5 and 2.

2. Follow a similar procedure with the following parts of 7: 3 and 4, 6 and 1, 2 and 5, 1 and 6, and 4 and 3.

Book Lesson

Ex. 1-2. Work with the children on each of these exercises. First, have the children identify and record the number in all, the number in one part, and the number in the other part. Then call attention to the fact that pupils are to write the whole story about the specified group and its parts. Have each of the stories which make up the whole story given orally and then recorded in the space provided.

Ex. 3. Use this as an illustrative example, making sure the children see that they are to write the whole story about 7 and its parts, 5 and 2, in vertical form. Let them then complete each of the four stories which make up the whole story.

Ex. 4-8. Permit the children to proceed independently on these exercises, working as in *Ex. 3.*

Differentiations and Extensions. Give *more capable children* abstract statements about a group and its parts, as follows, and then have them write the whole stories:

$$6 \mid 4 \text{ and } 2$$

$$7 \mid 3 \text{ and } 4$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$5 \mid 4 \text{ and } 1$$

$$7 \mid 5 \text{ and } 2$$

$$\underline{\quad}$$

$$\underline{\quad}$$

$$\underline{\quad}$$

$$\underline{\quad}$$

$$\underline{\quad}$$

$$\underline{\quad}$$

$$\underline{\quad}$$

$$\underline{\quad}$$

Whole Stories

1.



6

in all

— are red.

— is blue.

Write the whole story
about 6 | 5 and 1.

2.



— in all

— are yellow.

— are black.

Write the whole story
about 7 | 4 and 3.

3.



The whole story
about 7 | 5 and 2

$$\begin{array}{r} 5 \quad 2 \quad 7 \quad 7 \\ + 2 + 5 - 2 - 5 \end{array}$$

4.



The whole story
about 7 | 6 and 1

$$\begin{array}{r} 6 \quad 1 \quad 7 \quad 7 \\ + 1 + 6 - 1 - 6 \end{array}$$

5.



The whole story
about 7 | 3 and 4

$$\begin{array}{r} + \quad + \quad - \quad - \end{array}$$

6.



The whole story
about 6 | 2 and 4

$$\begin{array}{r} + \quad + \quad - \quad - \end{array}$$

7.



The whole story
about 7 | 1 and 6

$$\begin{array}{r} + \quad + \quad - \quad - \end{array}$$

8.



The whole story
about 7 | 2 and 5

$$\begin{array}{r} + \quad + \quad - \quad - \end{array}$$

Pupil's Objectives: (a) To try to write abstract whole stories, particularly those involving groups of 7, with only a single incomplete fact given; (b) to try to write whole stories for 8 when a representation of the parts is shown; and (c) to maintain recall of abstract facts with sums and minuends through 6.

New Word: *try*

Background

1. Note particularly the following features of the work on this trial page:

a. The whole stories in Ex. 1-2, involving groups of 6 and 7, are abstract work set in both horizontal and vertical form.

b. The work of Ex. 3-4 is designed to see whether the children can transfer the principle of the whole story to the group of 8 and its parts, with a representation of the parts shown.

2. Be certain to note the work for *all pupils* under Differentiations and Extensions.

Book Lesson

Ex. 1. In this exercise the children are to complete the first fact and then write the other three facts which make up the whole story.

Ex. 2. Let pupils work this exercise independently, as the work in all parts is similar to that in Ex. 1.

Ex. 3-4. Ask the children to try to write the whole story about each dot picture. Tell them that they have never written either of these whole stories before but that you think they can figure these out by themselves.

93

Try These

1. Finish each whole story.

a. $4 + 2 = \underline{\quad}$

b. $4 + 3 = \underline{\quad}$

c.

5			
+ 2			

2. Finish each whole story.

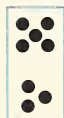
a. $2 + 5 = \underline{\quad}$

b. $6 + 1 = \underline{\quad}$

c.

3			
+ 4			

3. Try the whole story.



4. Try the whole story.



5. Write the answers.

$3 + 3 = \underline{\quad}$

$6 - 2 = \underline{\quad}$

$2 + 2 = \underline{\quad}$

2

2

$5 - 2 = \underline{\quad}$

$3 + 2 = \underline{\quad}$

$4 + 2 = \underline{\quad}$

$+ 1$

$+ 2$

$6 - 4 = \underline{\quad}$

$1 + 4 = \underline{\quad}$

$5 - 3 = \underline{\quad}$

$1 + 5 = \underline{\quad}$

$6 - 3 = \underline{\quad}$

$6 - 1 = \underline{\quad}$

Ex. 5. The children are to recall and write the answer for each example in this maintenance work.

Differentiations and Extensions

1. For *slower learners*, provide additional help and practice in two separate ways:

a. Writing whole stories for groups not exceeding 6 when an incomplete addition fact is given at the outset, as in Ex. 1 and 2.

b. Writing whole stories for groups involving 7 when a complete addition fact is given at the outset.

2. For *all children*, provide counters and have the children show each of the following:

a. a group of 2, as 1 and 1.

b. a group of 4, as 2 and 2.

c. a group of 6, as 3 and 3.

Help the children to recall that in each instance there is only *one* put-together story that can be written and only *one* take-away story. Use this as the basis for leading to the following understandings. The whole story about each of the following has only *two* stories rather than four.

$2 + 1$ and 1

$4 + 2$ and 2

$6 + 3$ and 3

$1 + 1 = 2$

$2 + 2 = 4$

$3 + 3 = 6$

$2 - 1 = 1$

$4 - 2 = 2$

$6 - 3 = 3$

3. For *more capable children*, provide one or more of the following kinds of experience:

a. Provide work in deriving whole stories in abstract form from situations where the first incomplete fact is subtraction.

$5 - 2 = \underline{\quad}$

$6 - 4 = \underline{\quad}$

$7 - 3 = \underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$6 - 1 = \underline{\quad}$

$7 - 6 = \underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

$\underline{\quad}$

b. Provide mixed practice similar to that in Ex. 5 but include sums and minuends as large as 7. You might even want to try one or two examples with the sum or the minuend as large as 8.

4. Have *all pupils* engage in appropriate number games (see *Teachers' Edition* pages 15-25). Selections may be made from the following: *Ask and Draw*; *Climb the Ladder* (6); *Fish* (6); *It* (1), (2), (3); *Number Bingo* (2), (3); *Numberland* (3), (4), (5); *Old Hat* (8); *Over Orange* (5); *Spin It* (3); *The Wizard* (10).

LOOKING AHEAD

You may wish to have the *more capable children* extend their manipulative and oral exploratory whole-story experiences to groups larger than 7 but not exceeding 10. For example, have these children show concretely a total group of 8 as two distinct sub-groups (for example, 6 and 2). Then have the children tell a pair of put-together stories and a pair of take-away stories (except in the case of sub-groups of 4 and 4) about the representation, thus giving the whole story about 8 and the parts shown. Have the children discover and tell all such whole stories about 8 and its parts.

Pupil's Objectives. (a) To solve problems involving group as large as 7; and (b) to try some abstract facts in addition and subtraction with sums and minuends as large as 7.

Book Lesson. Talk with the children about the pictures, indicating that each problem is about its picture.

Ex. 1-3. Read each of the problems with the children to eliminate any vocabulary difficulties. Then have the children work independently, referring to the pictures as needed.

Foot of page. Let pupils who have been building up to this type of experience, by working with representative groups as large as 7, try the examples in this exercise. Of course, for those who have been given special abstract practice, as has been suggested in earlier lesson plans (see Teaching Book One Pages 87 and 91), this exercise will be quite easy. However, if you challenge the others with the exercise, you may find that they will do very well also.

Differentiations and Extensions

1. For all pupils, prepare a problem sheet with work similar to that in Ex. 1-3, using familiar vocabulary and situations. Use sums and minuends as large as 7 and some kind of picture. Provide space to write each number story only in abstract form. Allow children to draw dot pictures or to use manipulative materials when reading and working the problems if it is necessary to do so.

2. If there is time between now and the end of the year, you might want to use sets of mixed addition and subtraction examples like those at the foot of Book One page 94. Have individual pupils come to your desk and work aloud as each one finds the answer for a selected example. Even if pupils are getting correct answers, you will find that many are using immature procedures. The raising of the procedure levels is a very worthwhile objective for the remainder of the school year.

3. For those pupils who are ready for practice at the abstract stage, prepare (or have your more capable children prepare) fact cards with sums and minuends of 7. These cards can be used with the other fact cards or separately for particular practice with the 7's.

LOOKING AHEAD

These suggestions are concerned with providing some oral developmental experiences in looking ahead to the time when written experiences with the quarter (25¢) will appear in the pupil's text.

1. Show children the 25¢ coin and ask its name: *twenty-five cents*, the *quarter*, and, occasionally, the *quarter dollar*. (You may want to call attention to the fact that four of these coins are as much as a dollar bill. Each coin is one fourth, or one quarter, of a dollar.) Ask the children to tell some of the things they have bought with a quarter.

2. Ask the children about the value of a quarter in terms of other coins (cent, nickel, dime).

a. First bring out and show that one quarter has the same value as 25 cents (1¢ coins).

b. Replace the 25 cents by nickels, exchanging 5 cents for 1 nickel, then another 5 cents for another nickel, etc., until the children see that one quarter has the same value as 5 nickels.

c. Replace 2 of the nickels in b with a dime. Then, replace 2 more nickels with another dime. Thus show that one quarter has the same value as 2 dimes and 1 nickel.

d. Allow children to use the "substitution" techniques above to find other coin combinations that have the same value as a

quarter—such as, 2 dimes and 5 cents; 1 dime, 2 nickels, and 5 cents; and so on.

e. Have the children play the game *Change My Quarter*. One child gives his quarter to another child and asks for "change" in a specific way—for example, 2 dimes and a nickel, or 4 nickels and 5 cents, etc. The second child gives the change if he is convinced of the correctness of the request.

NOTES

Using Put-Together and Take-Away Stories



1. There are 4 little dolls and 3 big dolls in the window. Find how many dolls in all.

dolls
dolls
dolls



2. Sue has 5 doll hats. Little Patsy takes away 2 of the hats. Find how many hats Sue then has left.

hats
hats
hats



3. Fred put 6 toy boats in the water. 2 of the toy boats raced away. How many boats did Fred have left?

boats
boats
boats

Try These

Write the answers.

$\begin{array}{r} 6 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$4 + 2 = \underline{\quad}$	$7 - 5 = \underline{\quad}$
$\begin{array}{r} 7 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 6 \\ \hline \end{array}$	$2 + 5 = \underline{\quad}$	$6 - 4 = \underline{\quad}$
				$3 + 4 = \underline{\quad}$	$7 - 3 = \underline{\quad}$
				$3 + 1 + 2 = \underline{\quad}$	
				$1 + 3 + 2 = \underline{\quad}$	

Pupil's Objective. To show the extent of selected number abilities acquired through the year.

New Word: *marbles*

Background. This is the first of a two-page testing sequence that embraces the work on *Book One* pages 83-94, along with selected number abilities developed previously. If you have not already administered all of the testing sequence on *Book One* pages 79-82, that material should be used before administering this test page. In any event, relate the use of this test page to the End-of-Year Progress Chart described on *Teachers' Edition* page 251.

Book Lesson. All activities should be familiar to the children. Be certain that the nature of each activity is understood and then permit the children to work independently. Circulate among the children to observe performance levels.

Ex. 1. In each case, have the pupils write in two ways the story about the group and its parts shown in the representative drawing.

Ex. 2. In each case, have the pupils write the pair of put-together or take-away stories, derived from the representative drawing.

Ex. 3. In each case, have the pupils finish the whole story.

Ex. 4-5. Have pupils read each problem and write the number story.

95

Do You Know?

1. How many in all? What are the parts?

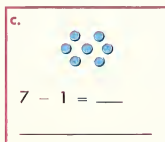
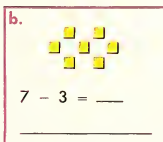
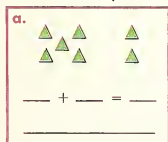


	and	
	and	

	and	
	and	

	and	
	and	

2. Write the pairs of stories.



3. Finish each whole story.

a. $2 + 4 = \underline{\quad}$

b. $5 + 2 = \underline{7}$

c.

4			
+ 3			
7			

4. Write your work.

Jack has 6 marbles. Little Tom takes 3 of the marbles. Find how many marbles Jack has then.

5. Write your work.

Patsy has 2 cakes and Susan has 4 cakes. Find how many cakes all together.

Pupil's Objective. To show further the extent of selected number abilities acquired through the year.

NOTES

Background. This is the second of the two-page testing sequence that embraces the work on *Book One* pages 83-94, along with selected number abilities developed previously. Be sure to relate the use of this test page to the End-of-Year Progress Chart described on *Teachers' Edition* page 251.

As was stated in connection with *Teaching Book One* Page 82, you may wish to pass along the completed Progress Charts to next year's teacher so that she will have these appraisals at hand at the beginning of the school year.

Book Lesson. All activities are familiar to the children. Be certain that the nature of each activity is understood and then permit the children to work independently. Circulate among the children to observe performance levels.

Ex. 1. In each case, have pupils finish the put-together story.

Ex. 2. In each case, have pupils finish the take-away story.

Ex. 3. In each case, have pupils finish the put-together or take-away story.

Foot of page. If some of the pupils had trouble with the work at the foot of *Book One* page 94, you may want to let the *more capable children* try this exercise. In each case, they are to recall and write answers for the put-together and the take-away stories in this exercise which includes some facts with sums and minuends of 7.

Do You Know?

1. Finish the stories.

$$\begin{array}{r} 4 + 2 = \underline{\quad} \quad 2 + 3 = \underline{\quad} \quad \begin{array}{r} 3 \\ + 3 \end{array} \quad \begin{array}{r} 2 \\ + 4 \end{array} \quad \begin{array}{r} 3 \\ + 2 \end{array} \quad \begin{array}{r} 1 \\ + 5 \end{array} \\ 1 + 4 = \underline{\quad} \quad 5 + 1 = \underline{\quad} \end{array}$$

2. Finish the stories.

$$\begin{array}{r} 6 - 3 = \underline{\quad} \quad 6 - 1 = \underline{\quad} \quad \begin{array}{r} 5 \\ - 3 \end{array} \quad \begin{array}{r} 6 \\ - 2 \end{array} \quad \begin{array}{r} 6 \\ - 5 \end{array} \quad \begin{array}{r} 5 \\ - 4 \end{array} \\ 5 - 2 = \underline{\quad} \quad 6 - 4 = \underline{\quad} \end{array}$$

3. Write the answers.

$$\begin{array}{r} 5 \quad 6 \quad 2 \quad 4 \quad 5 \quad 3 \quad 1 \quad 1 \quad 2 \\ + 1 \quad - 4 \quad + 3 \quad + 2 \quad - 2 \quad \begin{array}{r} 1 \\ + 2 \end{array} \quad \begin{array}{r} 4 \\ + 1 \end{array} \quad \begin{array}{r} 2 \\ + 2 \end{array} \quad \begin{array}{r} 3 \\ + 1 \end{array} \end{array}$$

$$\begin{array}{r} 1 + 4 = \underline{\quad} \quad 5 - 3 = \underline{\quad} \\ 6 - 3 = \underline{\quad} \quad 4 + 1 = \underline{\quad} \quad 2 + 1 + 2 = \underline{\quad} \\ 6 - 1 = \underline{\quad} \quad 3 + 3 = \underline{\quad} \quad 1 + 2 + 3 = \underline{\quad} \end{array}$$

Can You Do These?

$$\begin{array}{r} 5 \quad 1 \quad 4 \quad 3 \\ + 2 \quad + 6 \quad + 2 \quad + 4 \end{array} \quad \begin{array}{r} 6 + 1 = \underline{\quad} \quad 7 - 2 = \underline{\quad} \\ 7 - 4 = \underline{\quad} \quad 5 + 1 = \underline{\quad} \\ 6 - 3 = \underline{\quad} \quad 4 + 3 = \underline{\quad} \\ 2 + 5 = \underline{\quad} \quad 7 - 6 = \underline{\quad} \end{array}$$

$$\begin{array}{r} 7 \quad 6 \quad 7 \quad 7 \\ - 3 \quad - 2 \quad - 5 \quad - 1 \end{array}$$

End-of-Year Progress Chart

The Progress Chart for each child in your class, described below, affords an effective means of summarizing the extent to which you believe he has been able to achieve the various objectives suggested for this first year of systematic arithmetic instruction.

Preparing the Chart. Duplicate a form like that suggested below for each child in your class. Note that only the first three instructional objectives have been listed in the sample form. The remaining objectives to be included in the Progress Chart are:

4. Ability to read number words to *twelve*
5. Ability to count by rote to 100
6. Ability to use enumeration (rational counting) to identify and reproduce groups as large as 100 as needed
7. Understanding of the serial order and relative sizes of numbers to 100
8. Ability to recognize at a glance the size of regularly patterned groups as large as 10
9. Understanding of ability to use ordinals,—orally as far as *twelfth*, and in relation to written experiences as far as *seventh*
10. Understanding of the structural meaning of numbers in terms of the decimal (tens) base of our number system, coupled together with the principle of place-value in our system of notation,—developed to 100 in relation to written experiences, with an extension of the structural meaning of numbers through oral and manipulative experiences to 200
11. Ability to count by rote and to enumerate by 2's to 20
12. Ability to count by rote and to enumerate by 10's to 100
13. Understanding of the counting sequence by 5's to 50, oral work only
14. Understanding of money and its use: written experiences with the cent, nickel, and dime; oral experiences only with the quarter
15. Ability to tell and show time: on the hour in relation to written experiences, and on the half hour in relation to oral experiences only
16. Ability to recognize common measuring instruments and occasions for their use

17. Ability to recognize fractional parts of a single object: halves and one half in written experiences, fourths and one fourth in oral experiences only

18. Ability to recognize and reproduce the circle and the square

19. Understanding of groups and numbers in terms of their component parts, coupled with an understanding of the relationship that permits most parts "stories" to be expressed in related pairs: for groups as large as 6 (or 7 for *more capable children*)

20. Understanding of the dynamics of combining and separating, with intelligent control over addition and subtraction facts through sums and minuends of 6 (or 7 for *more capable children*)

21. Ability to read and write addition and subtraction facts, in horizontal or vertical form with accompanying operational symbols, through sums and minuends of 6 (or 7 for *more capable children*)

22. Understanding of the relationships that permit most addition facts and most subtraction facts to be written in pairs, and that permit related pairs of addition and subtraction facts to be written as "whole stories"

23. Mastery of addition and subtraction facts through sums and minuends of 6 (progress toward mastery through 7 for *more capable children*)

24. Ability to combine 3 groups and to read and write number stories involving 3 addends, horizontally or vertically, through sums of 6

25. Understanding of the relationships involved when 1 is added to a number and when 1 is subtracted from a number, developed with sums and minuends through 10

26. Ability to deal with simple oral and written problem situations involving combining and separating

27. Understanding the combining of equal groups as readiness for the ultimate systematic study of multiplication.

28. Disposition to use, and the habit of using, number in practical ways

29. Possession of desirable emotionalized responses with respect to arithmetic,—favorable attitudes, appreciations, and values

Using the Chart. On the Progress Chart for each child, place a check mark in the appropriate column after each number ability listed, to indicate the child's level of attainment in that ability. Base your judgments on the following:

- a. pupil's performance in the test items on *Book One* pages 79–82 and 95–96 which are related to a particular objective;
- b. your observation of the child in his day-to-day work with number experiences, both systematic and incidental;
- c. pupil's performance on number tasks you may devise specifically to determine the level of attainment of certain objectives.

A careful examination of each completed Progress Chart will reveal clearly for each child his areas of strength and weakness relative to the established objectives. The Progress Charts also may be used to identify easily groups of children with common strengths or weaknesses, thus providing a basis for remedial instruction where needed most before the end of the year.

Preserve your completed charts and pass them along to each child's teacher next year. They will provide her with invaluable information as she begins the new year of systematic instruction in number.

Progress Chart for _____				
(Name of Child)				
Objective	Level of Attainment			
	Superior	Satisfactory	Questionable	Unsatisfactory
1. Ability to use understandingly words for comparison of sizes and positions and many common quantitative terms other than numbers				
2. Ability to read numerals to 100				
3. Ability to write numerals to 100				
4.				

Suggestions for Extended Work on Basic Facts

As explained on page 132 of the Teachers' Edition, the last pages of *Book One* (pages 83-96) provide optional work covering addition and subtraction facts with sums and minuends of 7. If you feel you want to have your pupils proceed beyond this point, the best plan is not to use written work but, instead, to provide *oral manipulative experiences* involving the addition and subtraction facts with sums and minuends of 8, of 9, and even of 10. (Some children may be able to work through the 11's and 12's.) You

may want to base this extended work on what pupils already have done in connection with the suggestions for oral and manipulative experiences in the Looking-Ahead sections found on Teaching *Book One* Pages 83, 87, 90, and 93. This will provide the optimum developmental program because your pupils will thus acquire the thorough readiness which leads definitely into the written experiences provided in *NUMBERS WE NEED Book Two*.

New Words by Pages in NUMBERS WE NEED PRIMER

The 19 words listed as new are the *only* words used in *NUMBERS WE NEED Primer*. No more than two new words are used on a page and each new word is used at least twice on that page.

18 one	59 dogs	67 in
two		all
19 three	60 trucks	69 take
	are	away
29 four	61 children	70 apples
38 five	62 birds	is
57 and	63 wagons	71 hats

New Words by Pages in NUMBERS WE NEED BOOK ONE

There are 97 new words in *NUMBERS WE NEED Book One*, in addition to words assumed as known by pupils entering the second half of the first grade. No more than two new words are used on a page and each new word is used at least twice on that page.

1 how	16 car(s)	34 goes	52 answers	72 about
many	left	with		there
3 seven	20 finish	35 Eskimos	55 missing	73 orange
six	numbers		57 dime	these
4 eight	21 write	36 match	nickel(s)	74 dots
o'clock		things	58 old	
5 part	22 yellow	37 eleven	59 each	75 stars
ring		twelve		
6 group	26 cups	38 bears	61 show	78 spent
whole	plates	dolls	time	window
7 find	27 pair	40 cats	62 more	83 flowers
together	way	hens	63 socks	84 bug
9 put	28 story	42 books	66 fish	85 swings
stories		crayons	were	86 eating
10 draw	29 cowboys	45 boys	67 eggs	nests
	horses	girls	taken	87 caught
11 nine	31 cent(s)	46 playing	68 heaviest	89 canoes
ten	penny		tallest	
14 no	32 bubbles	47 Indians	69 boxes	90 tepees
yes	glasses		buys	
15 by	33 cover	48 clowns		93 try
count	of	51 bicycles	70 lines	95 marbles

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